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**Noguchi et al.**

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(54) **NEEDLE THREAD PASSING DEVICE**

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*Primary Examiner* — Tejash Patel

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(2), (4) Date: **Sep. 10, 2010**

(57) **ABSTRACT**

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A needle thread passing device is capable of being constructed in a small size for easy storage.

PCT Pub. Date: **Sep. 17, 2009**

A needle receiving member **34** has a needle insertion hole **34c** and a thread insertion slit **34e** forming an angle with the needle insertion hole **34c**. A needle threader member **42** is movable between positions away from and close to the needle receiving member **34** and has a needle threader pin **48b** that can push a thread inserted through the thread insertion slit **34e** into a needle eye **52a** of a needle **52** inserted into the needle insertion hole **34c** when the needle threader member **42** moves from the position away from the needle receiving member **34** to position close thereto. A cover **32** can move with respect to a main body **30** containing the needle receiving member **34**. The needle threader member **42** is constantly biased toward the position away from the needle receiving member **34**. The cover **32** can move between a locking position at which the needle threader member **42** is locked to the position close to the needle receiving member **34** and an allowable position at which the needle threader member is allowed to move between the positions away from and close to the needle receiving member. At the storage time, the cover is located at the locking position.

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(30) **Foreign Application Priority Data**

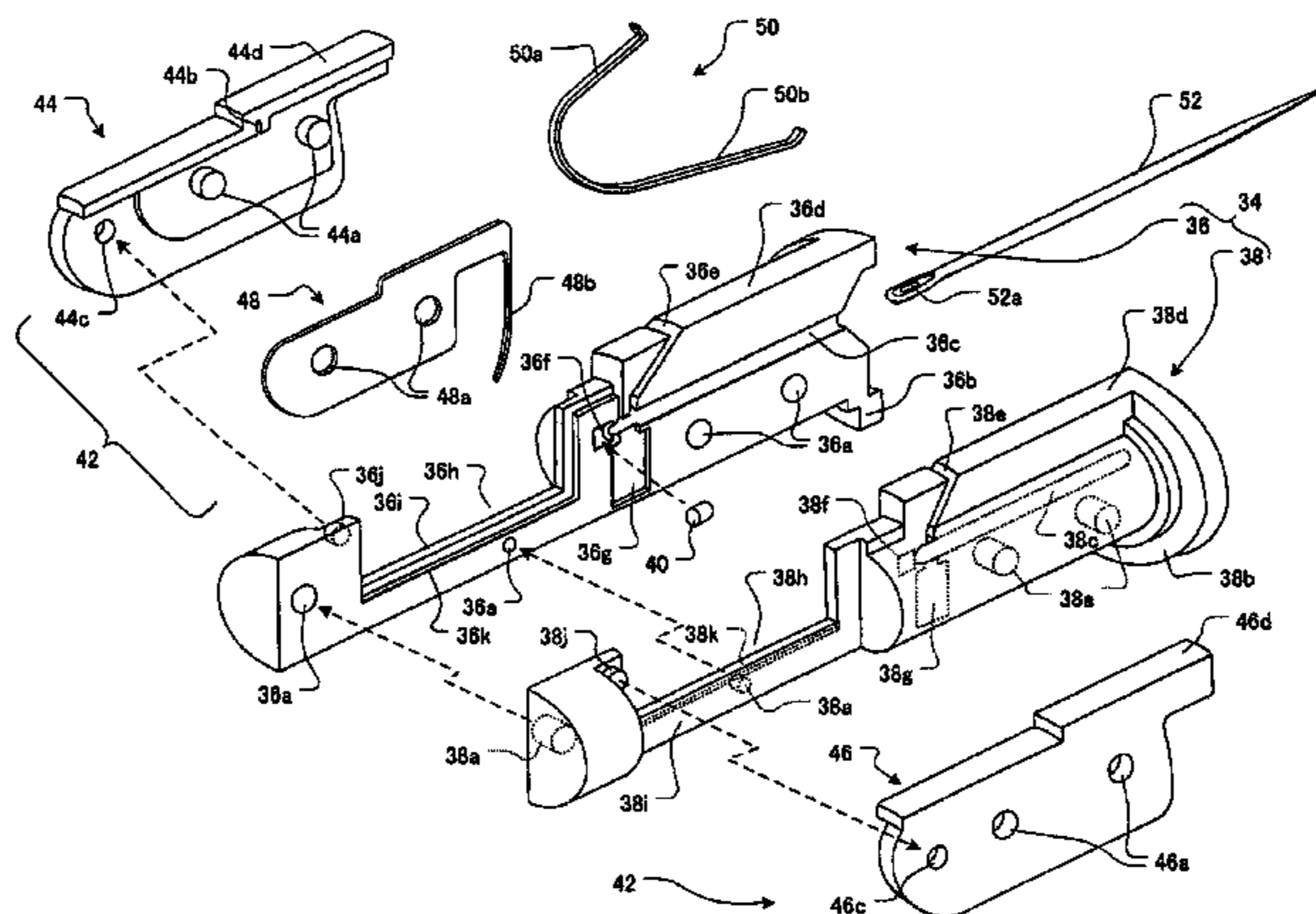
Mar. 10, 2008 (JP) ..... 2008-060327

(51) **Int. Cl.**  
**D05B 87/00** (2006.01)

(52) **U.S. Cl.**  
USPC ..... **112/224**

(58) **Field of Classification Search**  
USPC ..... 112/224, 225, 226, 227, 302; 223/1, 99  
See application file for complete search history.

**20 Claims, 17 Drawing Sheets**



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Fig. 1

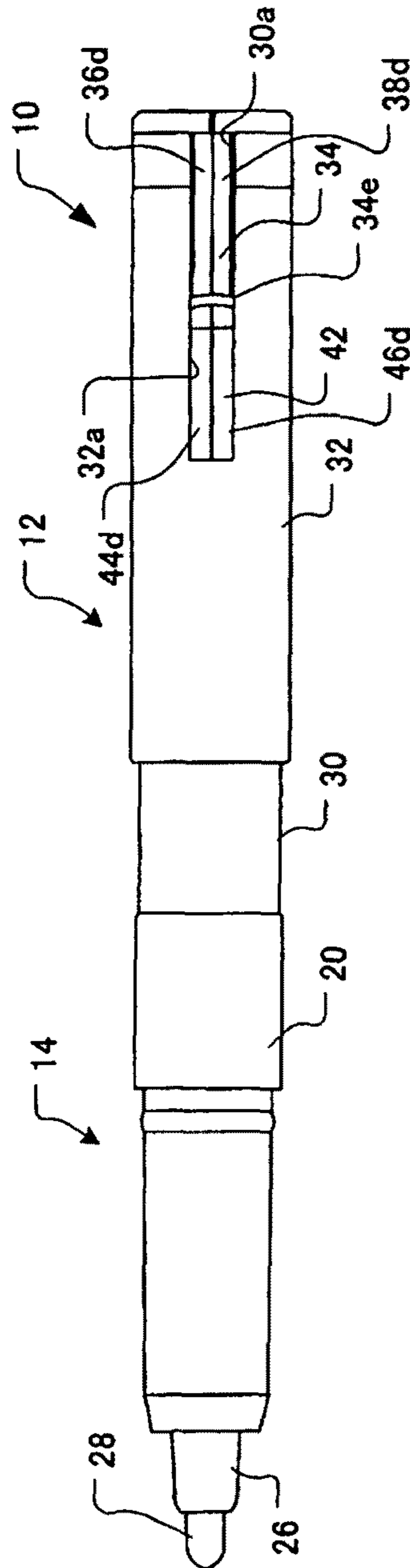


Fig. 2

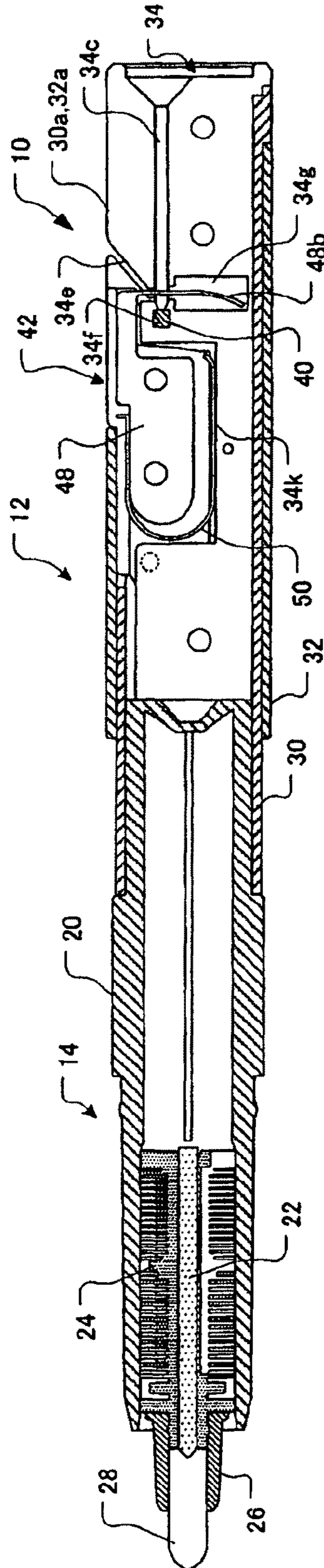


Fig. 3

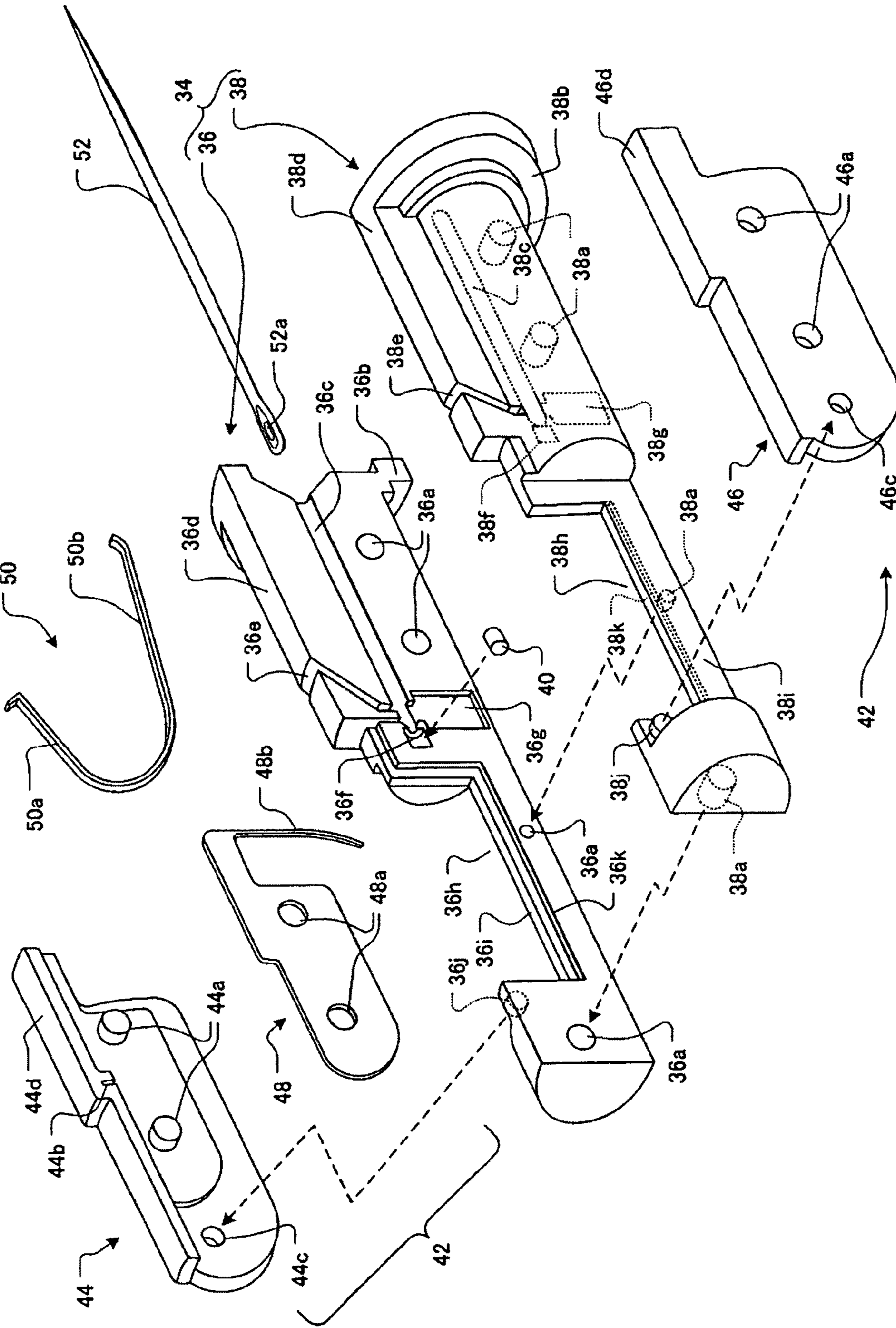


Fig. 4

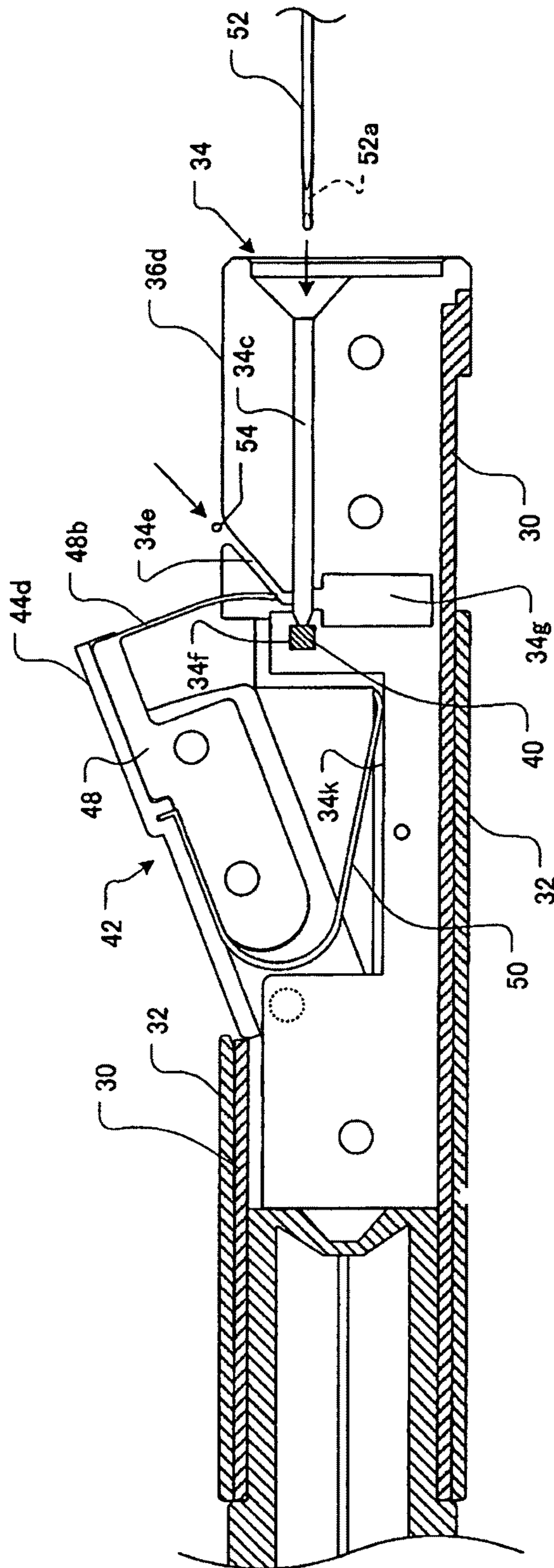


Fig. 5

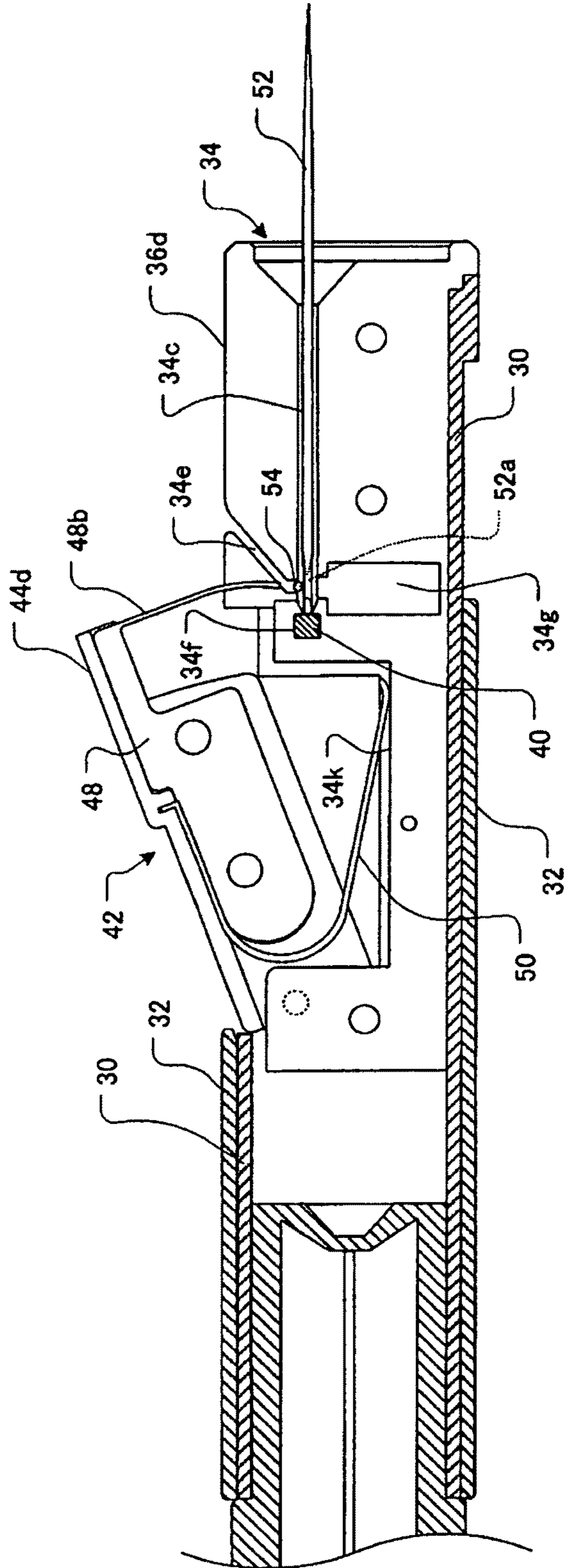


Fig. 6

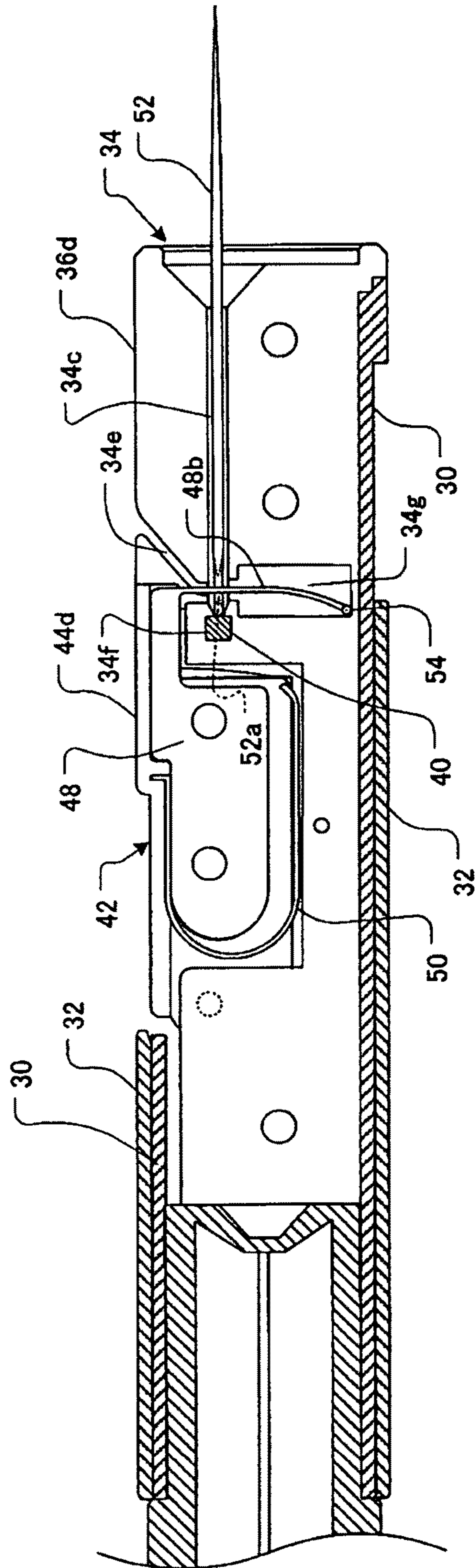




Fig. 7

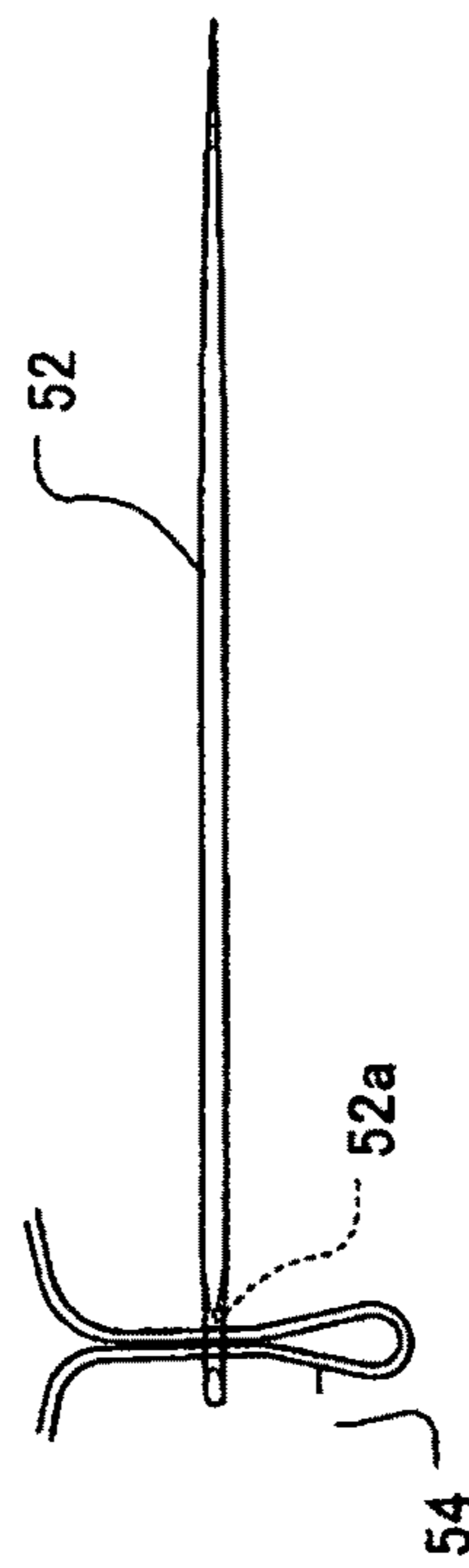


Fig. 8

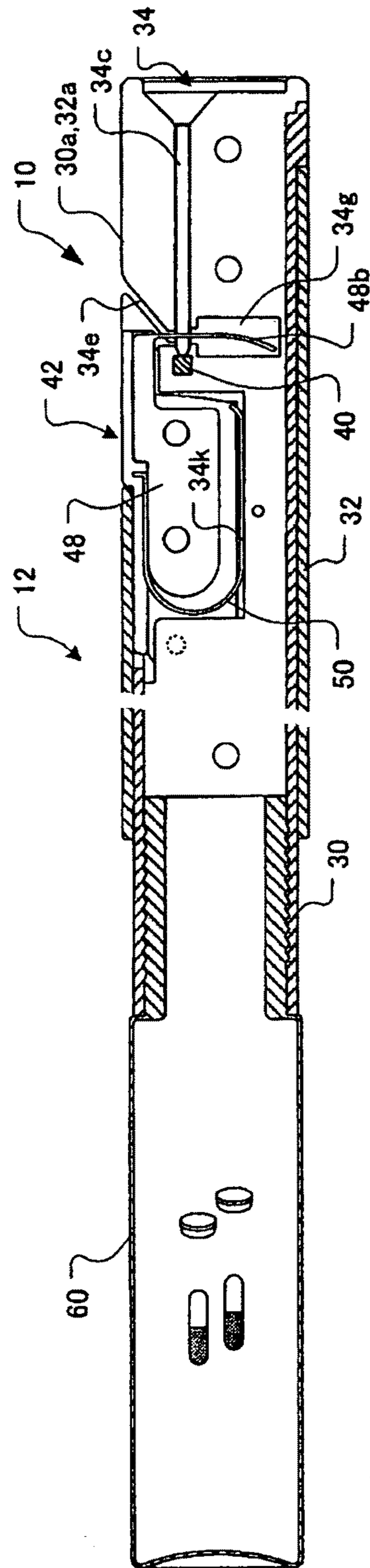


Fig. 9

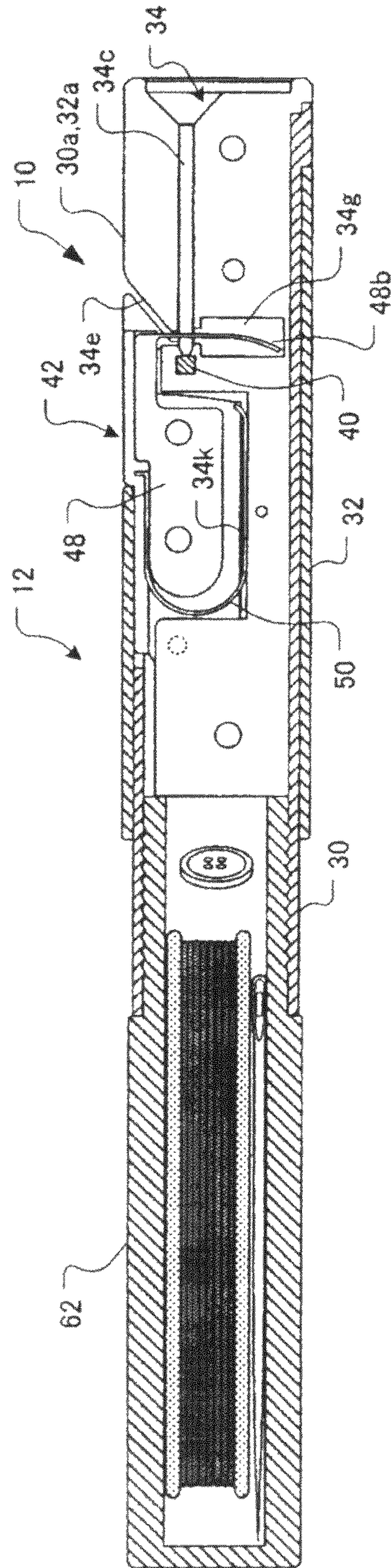


Fig. 10

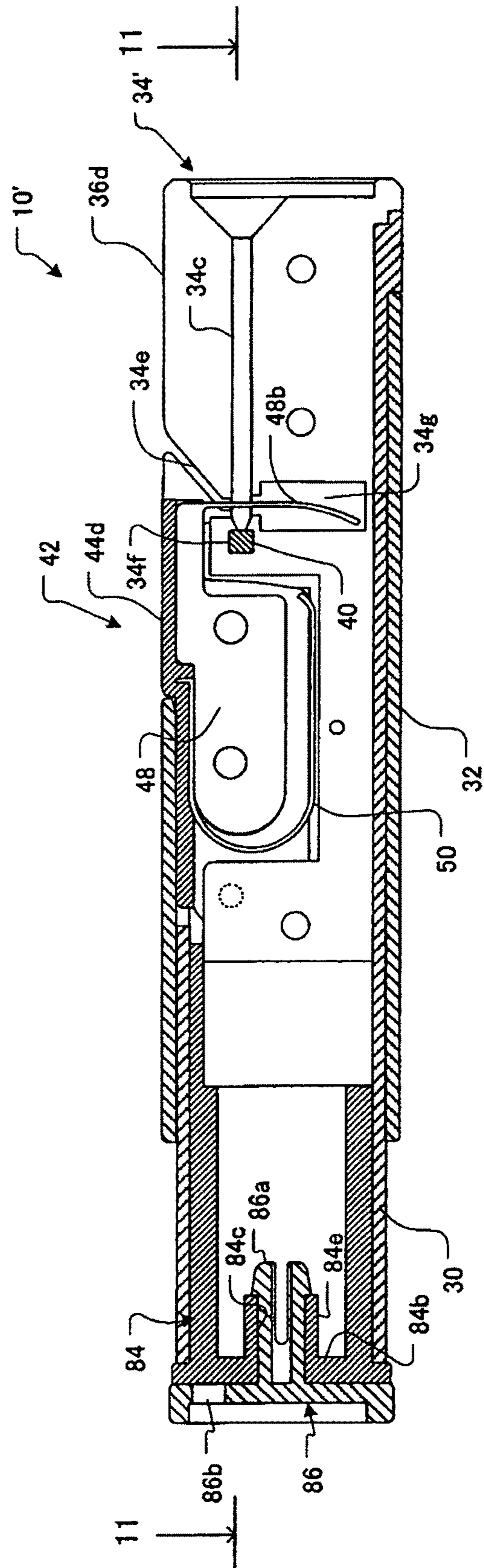


Fig. 11

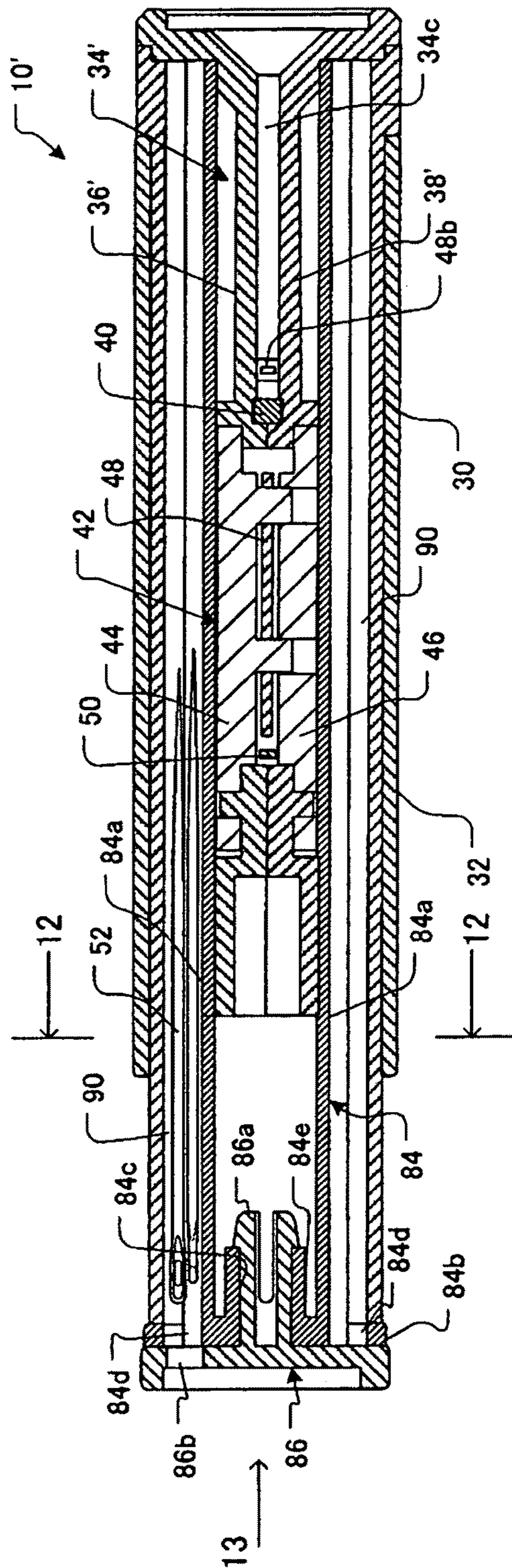


Fig. 12

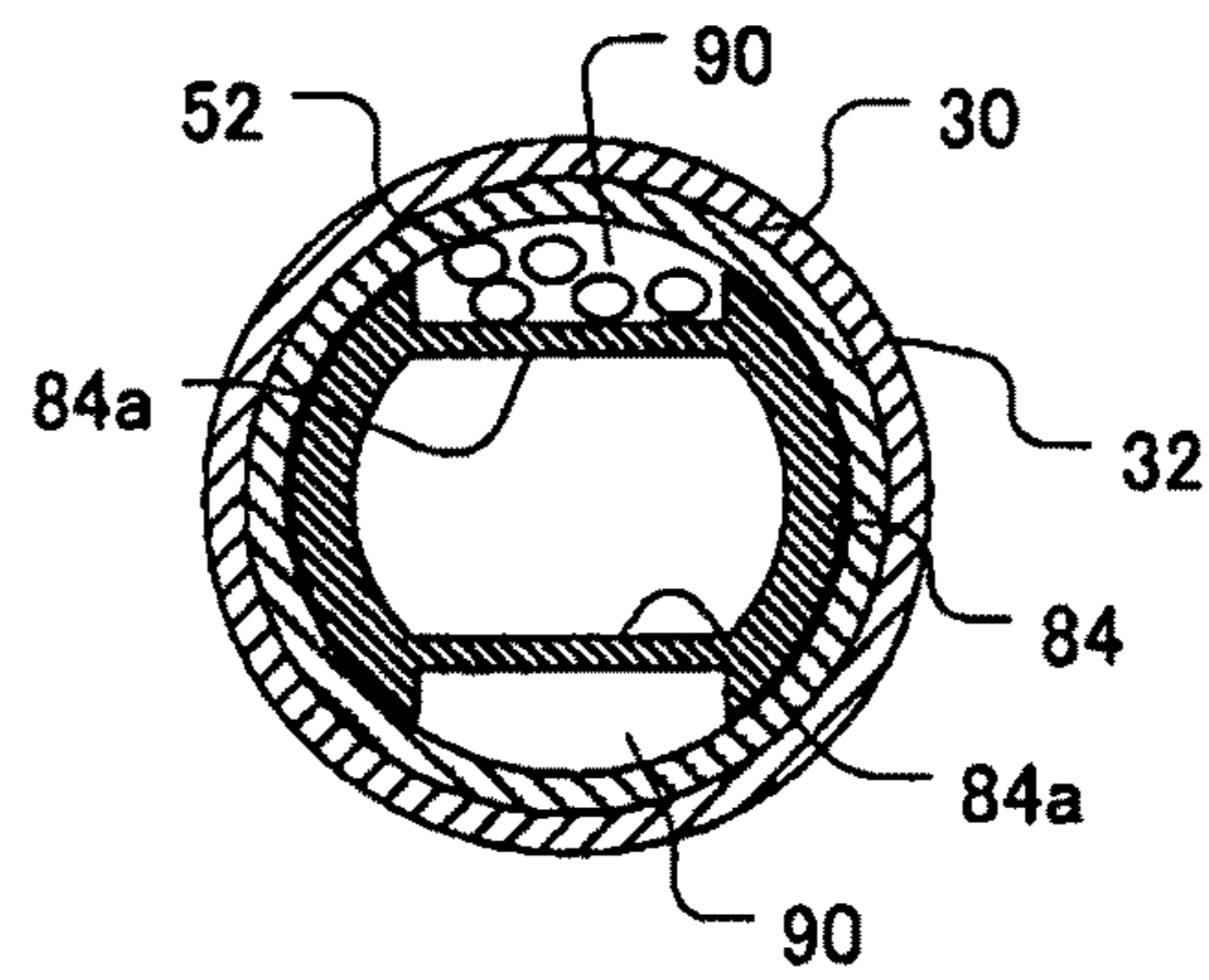


Fig. 13

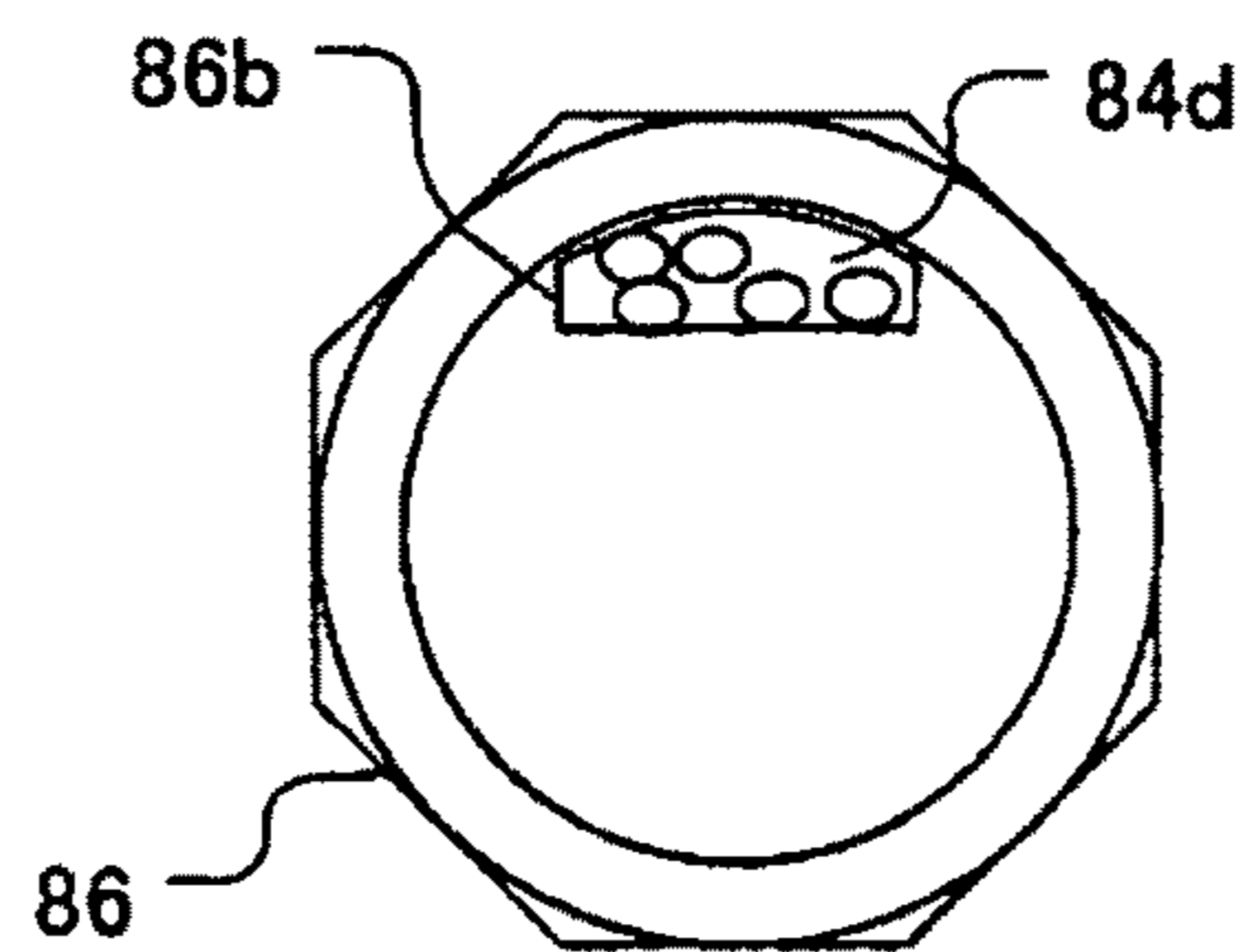


Fig. 14

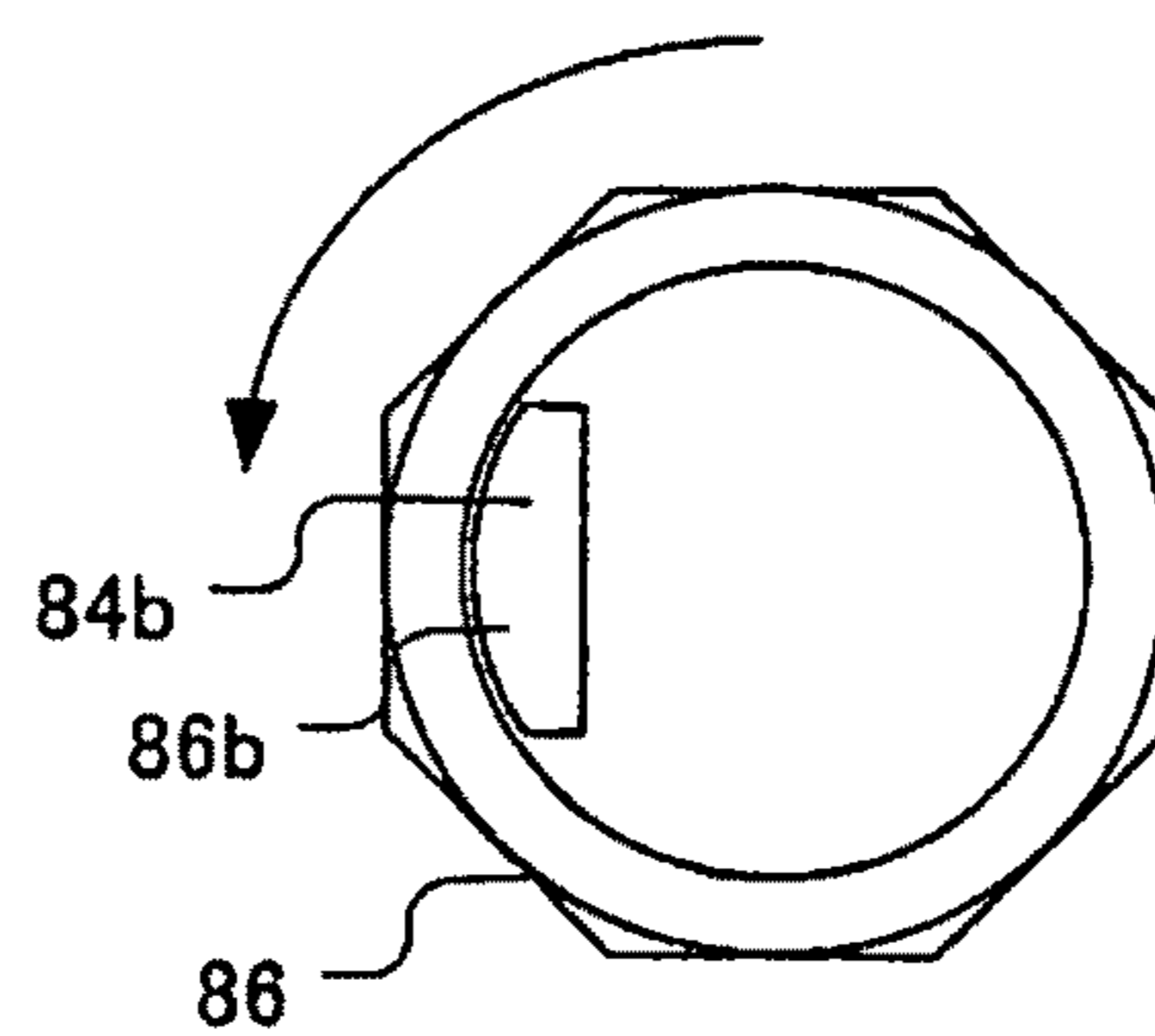


Fig. 15

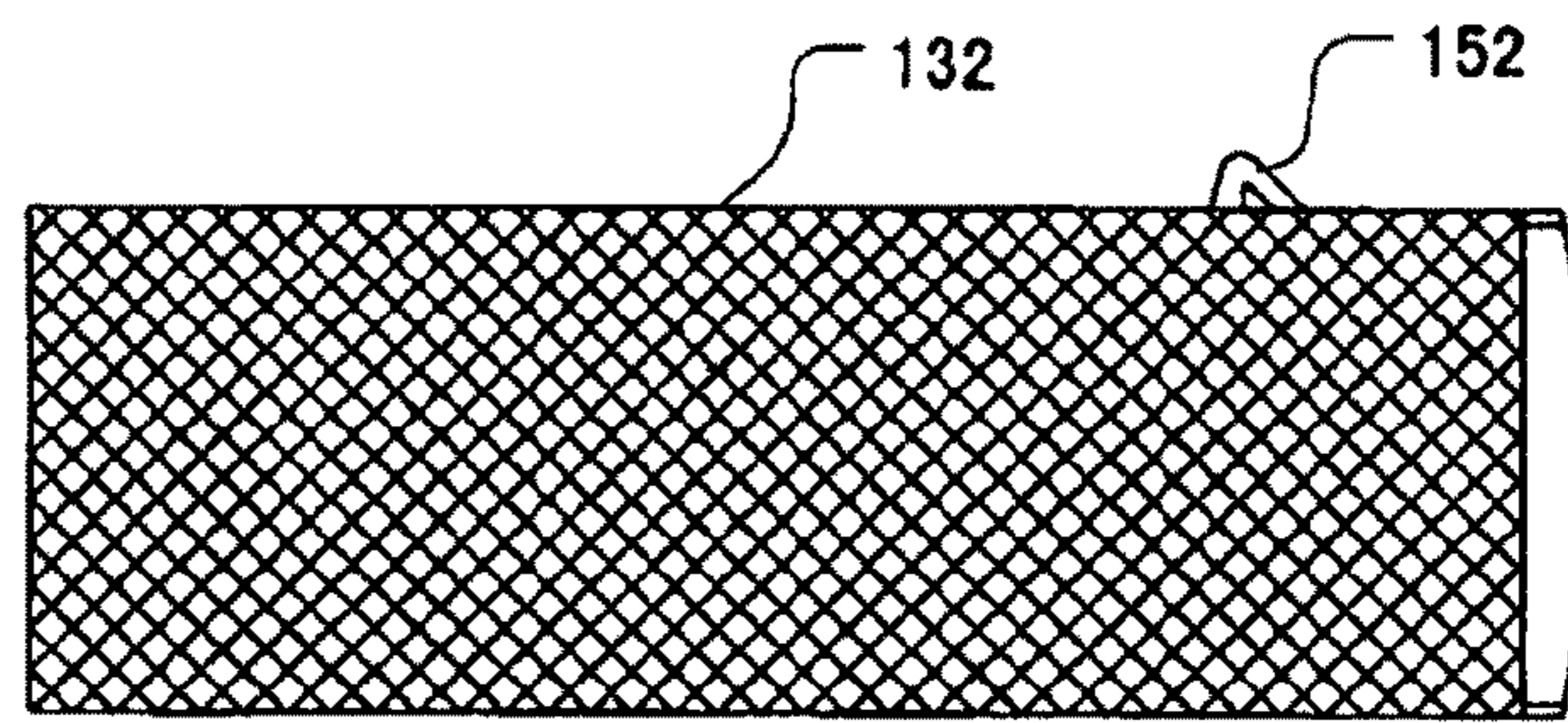


Fig. 16

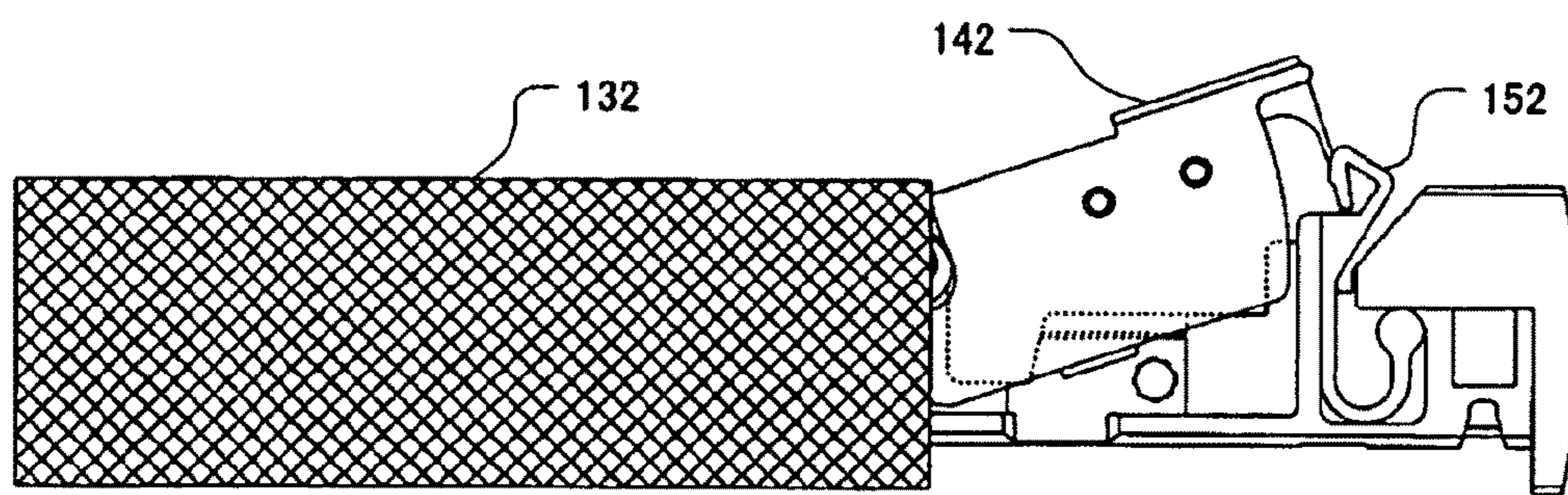


Fig. 17

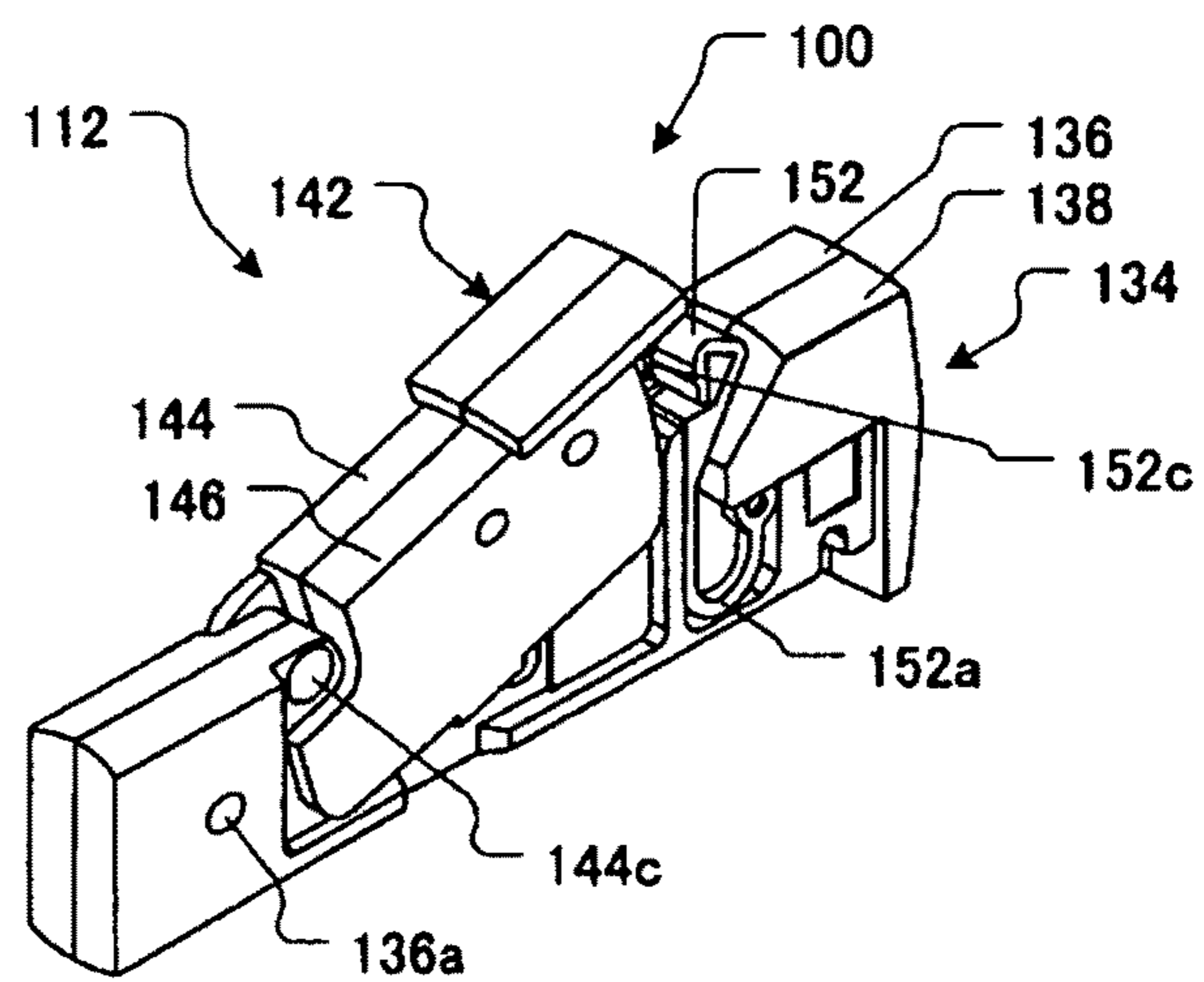




Fig. 18

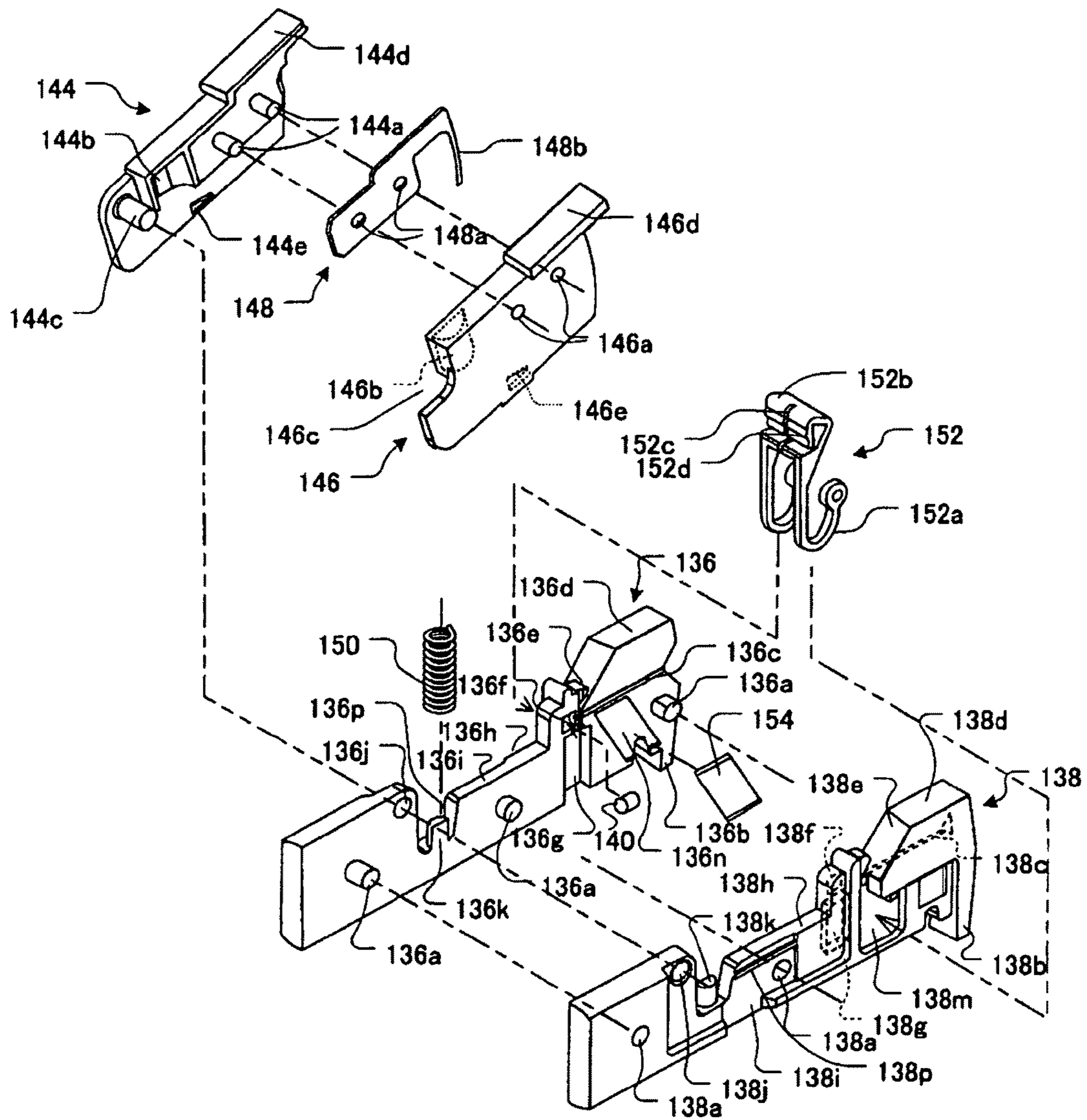


Fig. 19

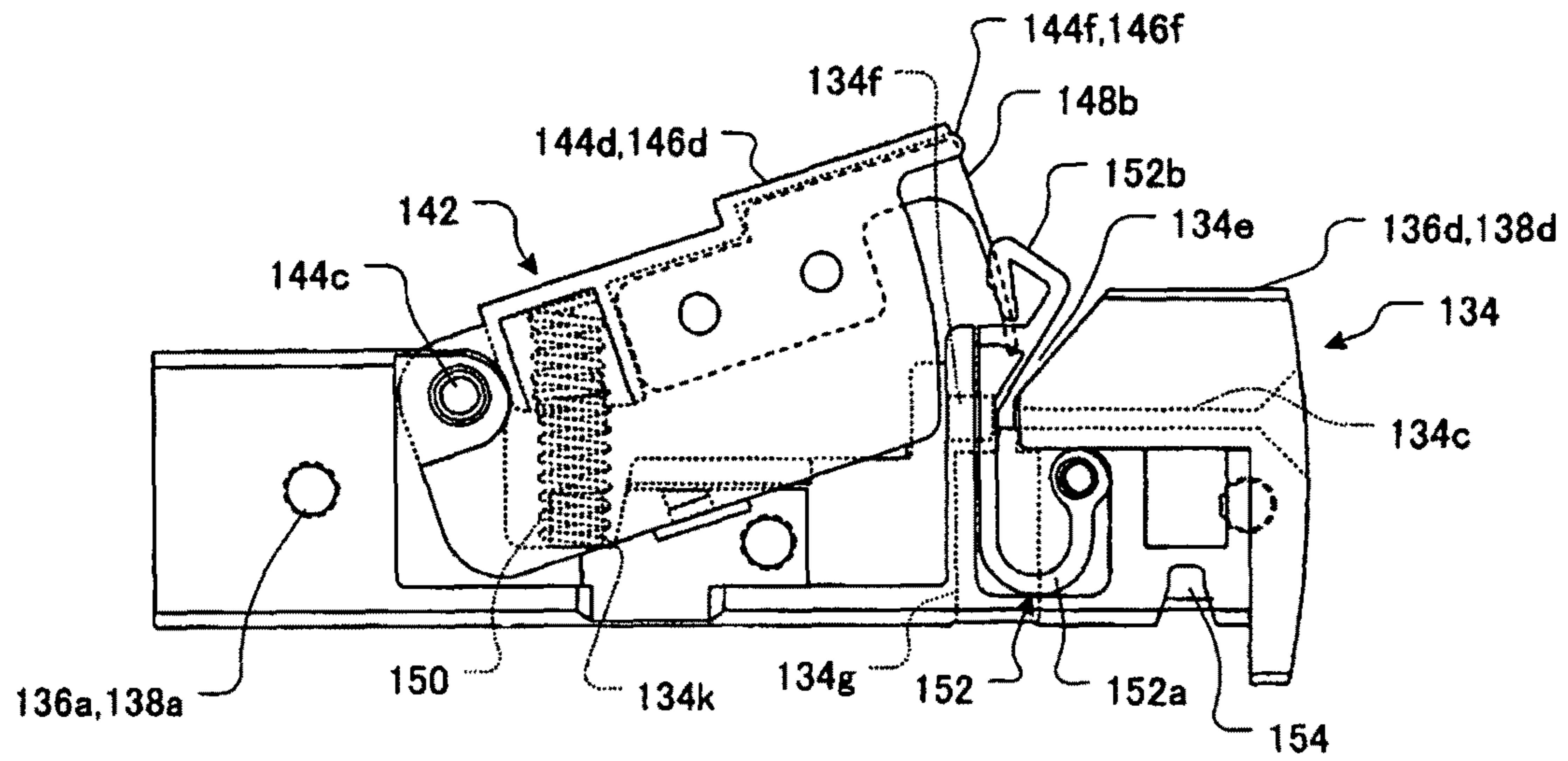


Fig. 20

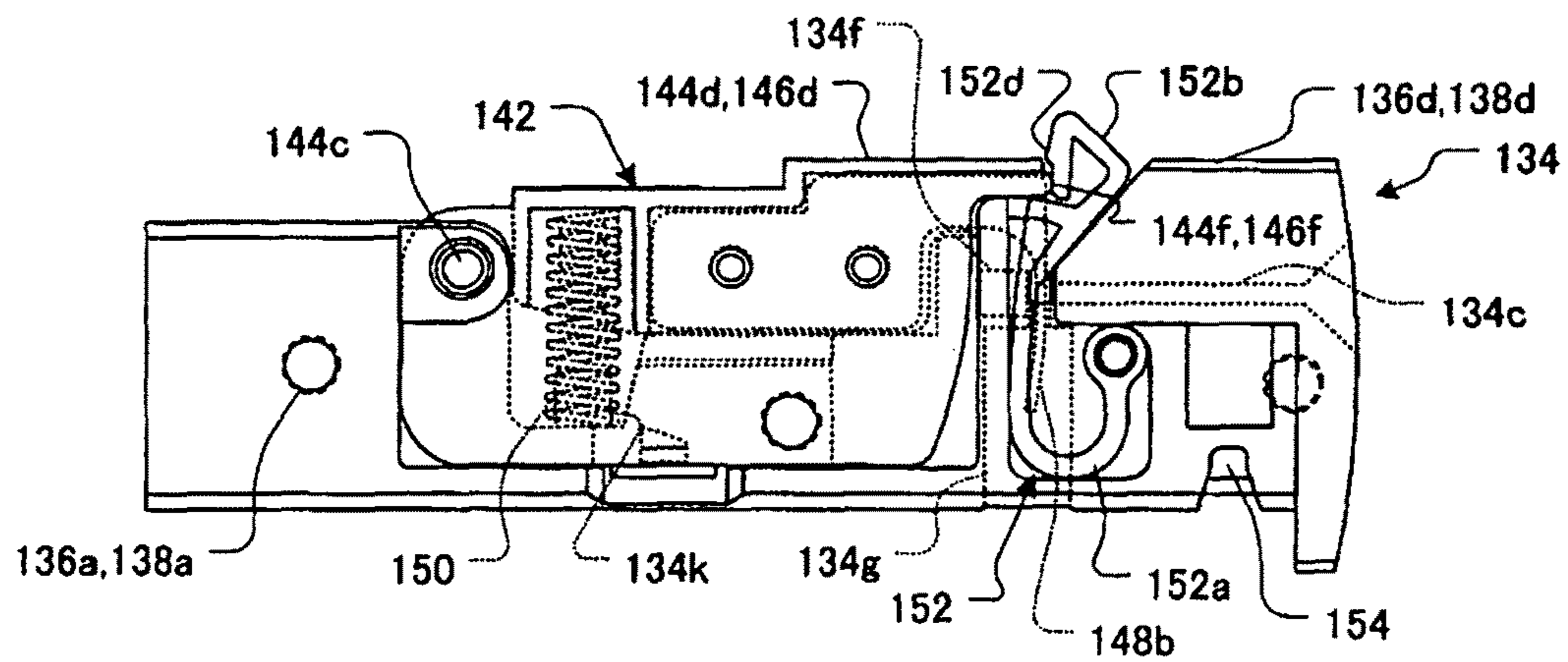
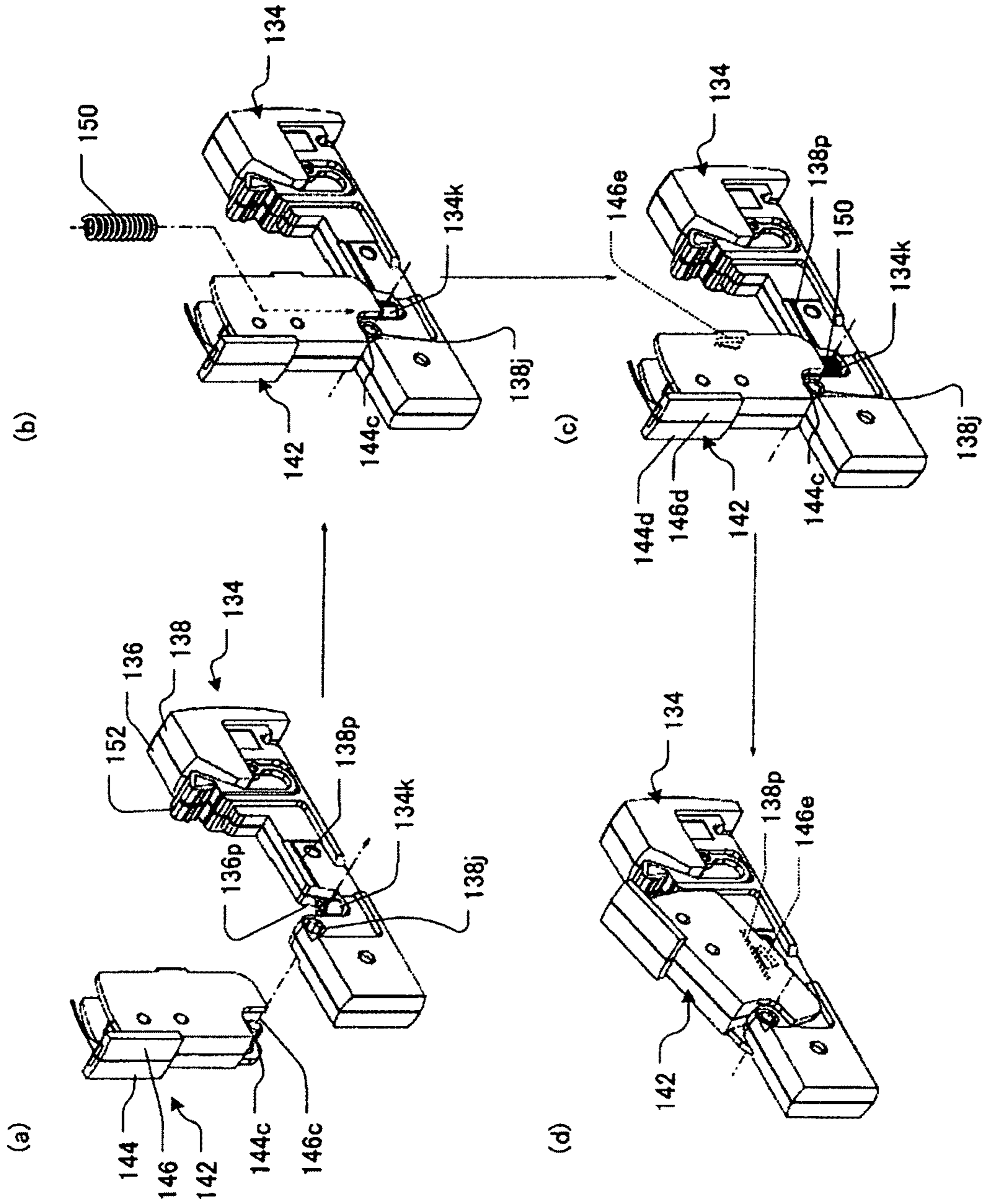


Fig. 21



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## NEEDLE THREAD PASSING DEVICE

## TECHNICAL FIELD

The present invention relates to a needle thread passing device for facilitating insertion of an end of a thread in the eye of a needle.

## BACKGROUND ART

As a needle thread passing device of such a type, one disclosed in Patent Documents 1 (Japanese Patent No. 3,315,364) is known. In this needle thread passing device, a needle insertion cylinder having a bottomed needle insertion hole is placed upright on a main body having a pedestal surface, and a thread passing hole to be communicated with a needle eye of an inserted needle is formed in a lower portion of the needle insertion cylinder in a direction crossing the needle insertion hole. A thread placement portion is formed near the entrance of the thread passing hole, and a thread locking piece is provided at an operating member provided in the main body. The thread locking piece is configured to be freely inserted into and removed from the thread passing hole through the operating member by a pressing force of a pressing member provided in the main body. In this configuration, a needle is inserted into the needle insertion hole of the needle insertion cylinder, a thread is set at the thread placement portion, and the pressing member is pressed. Then, the operating member is swung. As a result, the thread locking piece provided in the operating member pulls the thread set at the thread placement portion into the thread passing hole, whereby the thread is inserted into the needle eye. When the pressing force of the pressing member is released, the operating member swung back by a spring to its original position. As a result, the thread is passed through the needle eye.

Patent Documents 1: Japanese Patent No. 3315364

## SUMMARY OF THE INVENTION

## Technical Problem

However, in the needle thread passing device of Japanese Patent No. 3,315,364, a space for the operating member to swing is provided in the main body and thereby the size of the main body is increased. As a result, the apparatus takes up much space, leading to inconvenience for storage.

The present invention has been made in view of the above problem, and an object thereof is to provide a needle thread passing device capable of being constructed in a small size for easy storage.

## Solution to Problem

To attain the above object, according to an aspect of the present invention, there is provided a needle thread passing device including a needle receiving member formed with a needle insertion hole and a thread insertion slit forming an angle with the needle insertion hole, a needle threader member that is movable between positions away from and close to the needle receiving member and has a needle threader pin that can push a thread inserted through the thread insertion slit into an eye of a needle inserted into the needle insertion hole when the needle threader member moves from the position away from the needle receiving member to position close thereto, and a changeover member that can move with respect to the needle receiving member. The needle threader member is constantly biased toward the position away from the needle

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receiving member, and the changeover member can move between a locking position at which the needle threader member is locked to the position close to the needle receiving member and an allowable position at which the needle threader member is allowed to move between the positions away from and close to the needle receiving member.

When the changeover member is located at the locking position, the needle threader member is locked at a position close to the needle receiving member, so that at the time of nonuse, the needle thread passing device can be made in a compact form for easy storage. At the time of use, the changeover member is moved to the allowable position so as to allow movement of the needle threader member. Thus, the needle threader member can automatically move to the position away from the needle receiving member by the biasing force. After a needle and thread are inserted into the needle insertion hole and thread insertion slit, respectively, the needle threader member is moved against the biasing force, thereby allowing the thread to be pushed into a needle eye by the needle threader pin. Thus, the needle threader member is made movable only at the time of use, and the needle thread passing device can be made in a compact form at the time of nonuse.

The needle threader member can swing so as to allow the tip end thereof to move between the positions away from and close to the needle receiving member, and the changeover member can comprise a cover that covers at least a part of the needle threader member at the locking position.

When the cover covers at least a part of the swingable needle threader member, the swing of the needle threader member can be disabled.

The needle receiving member can be arranged in a cylindrical main body, the changeover member can be slid on the outside of the main body, and at least a part of the needle threader member can be arranged in the main body when located at the position close to the needle receiving member.

Since at least a part of the needle receiving member and the needle threader member can be housed in the cylindrical main body at the time of nonuse, the needle thread passing device can be made in a compact form, achieving easier storage.

A housing space may be formed between the main body and the needle receiving member.

Since the housing space can be formed between the main body and the needle receiving member, a needle thread passing device can provide high space efficiency and excellent storage capability.

A magnet may be arranged at the end portion of the needle insertion hole. Because a needle that has been inserted into the needle insertion hole is attracted by the magnet, the needle can be fixed in place, thereby preventing dropping of the needle.

The thread insertion slit may extend from the outside surface of the needle receiving member in the direction inclined with respect to the needle insertion hole, and then may extend toward the needle insertion hole in the direction perpendicular to the needle insertion hole.

Because the thread insertion slit extends in the direction perpendicular to the needle insertion hole at a position close to the needle insertion hole, it is sufficient for the thread inserted through the thread insertion slit to reach the portion extending in the direction perpendicular to the needle insertion hole in order for the thread to be pushed into the needle eye by the needle threader pin.

The needle thread passing device may be constructed by integrating a needle thread passing unit including the needle receiving member, the needle threader member, and the

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changeover member and a unit having a different function from that of the needle thread passing unit.

The size of the needle thread passing device can be reduced, so that it is possible to realize a needle thread passing device by integrating the needle thread passing unit with another unit having a different function from that of the needle thread passing unit.

The needle receiving member may further comprise a protecting member for guiding the movement of the needle threader pin. It can prevent the thin needle threader pin from being broken or bent when the needle threader member is inserted into the needle hole as the needle threader member can move from the position away from the needle receiving member to the position close thereto.

The protecting member may be deformable while the needle threader member approaches the needle receiving member so as to allow approach of the needle threader member. Due to deformation of the protecting member, the interference of the protecting member for guiding the movement of the needle threader pin can be prevented at when the needle threader member approaches the needle receiving member.

A notifying means for generating a sound or friction force may be provided between the needle receiving member and the needle threader member, which is produced while the needle threader pin of the needle threader member is passing through the needle insertion hole. The user of may recognize the completion of the movement operation of the needle threader member by the notifying means.

The needle threader member comprises a pair of needle threader supporting parts and a needle threader part including the needle threader pin arranged between the threader supporting parts. One of the needle threader supporting parts may include an axis pivotally supported by the needle receiving member and the other of the needle threader supporting parts may include a cut out portion at a location corresponding to the axis.

To assemble the needle threader member to the needle receiving member, when inserting the pivot provided on the one of the needle threader supporting parts into the needle receiving member, the cut out portion provided on the other of the needle threader supporting parts can avoid interference with the needle receiving member, which facilitates the assembling operation.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an entire view of a needle thread passing device according to a first embodiment of the present invention in a storage state;

FIG. 2 is a lengthwise cross-sectional view of the needle thread passing device of FIG. 1 in a storage state;

FIG. 3 is an exploded perspective view of the inside of the needle thread passing device of FIG. 1;

FIG. 4 is a lengthwise cross-sectional view of a main portion of the needle thread passing device of FIG. 1 at the time of use;

FIG. 5 is a lengthwise cross-sectional view of a main portion of the needle thread passing device of FIG. 1 at the time of use;

FIG. 6 is a lengthwise cross-sectional view of a main portion of the needle thread passing device of FIG. 1 at the time of use;

FIG. 7 shows a state where a thread has been inserted through a needle eye;

FIG. 8 is a lengthwise cross-sectional view showing a modification in which a unit different from the writing unit is integrated with the needle thread passing unit in the axial

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direction to constitute the needle thread passing device according to the present invention;

FIG. 9 is a lengthwise cross-sectional view showing another modification in which a unit different from the writing unit is integrated with the needle thread passing unit in the axial direction to constitute the needle thread passing device according to the present invention;

FIG. 10 is a lengthwise cross-sectional view of a needle thread passing device according to a second embodiment of the present invention in a storage state;

FIG. 11 is a cross-sectional view taken along the line 11-11 of FIG. 10;

FIG. 12 is a lateral cross-sectional view taken along the line 12-12 of FIG. 11;

FIG. 13 is a view showing the end surface of the needle thread passing device as viewed in the arrow 13 of FIG. 11; and

FIG. 14 is a view showing a state where a dial is rotated from the position shown in FIG. 13.

FIG. 15 is an entire view of a needle thread passing device according to a third embodiment of the present invention in a storage state;

FIG. 16 is an entire view of the needle thread passing device of FIG. 15 at the time of use;

FIG. 17 is a perspective view of a part of the needle thread passing device of FIG. 15;

FIG. 18 is an exploded perspective view of a main portion of the needle thread passing device of FIG. 15;

FIG. 19 is a lengthwise cross-sectional view of a main portion of the needle thread passing device of FIG. 15 at the time of use;

FIG. 20 is a lengthwise cross-sectional view of a main portion of the needle thread passing device of FIG. 15 at the time of use;

FIG. 21 is a perspective view of installation process of needle threader member of the needle thread passing device, FIG. 15 assembled to needle receiving member;

#### REFERENCE SIGNS LIST

- 10, 10', 100 needle thread passing device
- 12, 112 needle thread passing unit
- 14 writing unit (function unit)
- 30 main body
- 32, 132 cover (changeover member)
- 34, 34', 134 needle receiving member
- 34c, 134c needle insertion hole
- 34e, 134e thread insertion slit
- 40, 140 magnet
- 42, 142 needle threader member
- 48b, 148b needle threader pin
- 52 needle
- 52a needle eye
- 54 thread
- 60, 62 container (function unit)
- 90 housing space
- 144, 146 needle threader supporting parts
- 144c pivot
- 146c cut portion
- 152 protecting cover (protecting member)
- 152d small projections (notifying means)

#### DESCRIPTION OF EMBODIMENTS

Embodiments of the present invention will be described below with reference to the accompanying drawings.

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FIG. 1 is an entire view of a needle thread passing device according to a first embodiment of the present invention in a storage state, FIG. 2 is a vertical cross-sectional view thereof in a storage time, and FIG. 3 is an exploded perspective view of the inside thereof.

As illustrated, a needle thread passing device 10 according to the first embodiment has an elongated cylindrical shape as a whole. The needle thread passing device 10 includes a needle threader unit 12 provided on one side of the needle thread passing device 10 and a writing unit 14 provided on the other side thereof. The needle thread passing unit 12 and the writing unit 14 are connected to each other in the axial direction to constitute the needle thread passing device 10. The both units may be connected to each other by any suitable method, such as press fitting, bonding, screwing or like in a detachable or fixed manner. As a matter of course, the needle thread passing device 10 may be constituted only by the needle thread passing unit 12. However, in this embodiment, a use of the writing unit 14 enables writing on fabrics.

The writing unit 14 includes a writing unit main body 20 constituting an ink tank, a relay core 22, an adjuster 24 constructed in an comb-like shape for housing overflow ink, a tip element 26, a pen point 28, and a not-shown cap detachably attached to the pen point 28 so as to protect the same. The writing unit 14 may have any suitable configuration other than as illustrated or described herein.

The needle thread passing unit 12 includes a cylindrical main body 30 connected to the writing unit main body 20 of the writing unit 14 and a cover 32 which is a cylindrical changeover member covering the outside of the main body 30 and freely slidable in a predetermined range with respect to the main body 30 in the axial direction thereof. Elongated holes 30a and 32a are formed on the main body 30 and the cover 32, respectively, at positions aligned in the circumferential direction thereof so as to extend from the end portions thereof in the axis direction.

In the following description, as a matter of convenience, the writing unit 14 side of the needle thread passing unit 12 is referred to as proximal side, and its opposite side is referred to as distal side.

A needle receiving member 34 is arranged in the main body 30 so as to extend from the distal end side thereof. As shown in FIG. 3, the needle receiving member 34 is constituted by two needle receiving parts 36 and 38 which are substantially symmetric with respect to each other. A plurality of engagement projections 38a projecting from the needle receiving part 38 are fitted into a plurality of engagement holes 36a formed in the needle receiving part 36, whereby the substantially cylindrical needle receiving member 34 provided in the main body 30 is constructed. The needle receiving member 34 is fixed by press fitting, engagement, bonding or like in the main body 30.

Flange portions 36b and 38b are formed respectively at the distal ends of the needle receiving parts 36 and 38 so as to be abutted against the tip end surface of the main body 30.

Elongated groove portions 36c and 38c are formed respectively on the opposed surfaces of the needle receiving parts 36 and 38 so as to extend from the distal side. In a state where the needle receiving parts 36 and 38 has been fitted to each other to constitute the needle receiving member 34, the elongated groove portions 36c and 38c constitute a needle insertion hole 34c (see FIG. 2) for receiving a needle.

Projecting portions 36d and 38d partly projecting outward in the circumferential direction are formed in the needle receiving parts 36 and 38. In a state where the needle receiving parts 36 and 38 has fitted to each other to constitute the needle receiving member 34, a slight gap is formed between

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the opposed surfaces of the projecting portions 36d and 38d. This gap extends to the inside in the radial direction so as to communicate with the needle insertion hole 34c. Further, the projecting portions 36d and 38d slightly project from the elongated holes 30a and 32a of the main body 30 and the cover 32 and are therefore exposed.

Slits 36e and 38e are formed so as to obliquely extend from exposed surfaces of the projecting portions 36d and 38d. The slits 36e and 38e extend from the exposed surfaces toward the proximal side and then extend in the direction perpendicular to the needle insertion hole 34c constituted by the elongated groove portions 36c and 38c. The slits 36e and 38e constitute a thread insertion slit 34e (see FIG. 2). Housing grooves 36f and 38f are formed at the end portions, i.e., adjacent to the proximal end portions of the elongated groove portions 36c and 38c. The housing grooves 36f and 38f constitute a magnet housing portion 34f (see FIG. 2). A magnet 40 is housed in the magnet housing portion 34f.

Concave portions 36g and 38g are formed in the needle receiving parts 36 and 38 so as to extend from the end portions of the elongated groove portions 36c and 38c in the direction perpendicular to the elongated groove portions 36c and 38c and in the direction opposite to the projecting portions 36d and 38d. In a state where the needle receiving parts 36 and 38 has been fitted to each other to constitute the needle receiving member 34, the concave portions 36g and 38g constitute a thread pass hole 34g (see FIG. 2).

Cut out portions 36h and 38h are formed on the proximal side relative to the projecting portions 36d and 38d. The cut out portions 36h and 38h are surrounded by thin plate-like portions 36i and 38i. Pivots 36j and 38j are formed so as to project from the proximal end portions of the plate-like portions 36i and 38i. Lower top portions 36k and 38k are formed on the top surface of the plate-like portions 36i and 38i. The heights of the lower top portions 36k and 38k are lower at the opposed side than at the opposite side. The lower top portions 36k and 38k constitute a spring receiving surface 34k.

A needle threader member 42 is arranged so as to sandwich the plate-like portions 36i and 38i. The needle threader member 42 is constituted by two needle threader supporting parts 44 and 46 having substantially the same shape, a needle threader part 48 sandwiched by the needle threader supporting parts 44 and 46, and a spring 50 serving as a biasing member. A plurality of engagement holes 48a formed in the needle threader part 48 and a plurality of engagement holes 46a formed in the needle threader supporting part 46 are fitted to a plurality of engagement projections 44a formed on the needle threader supporting part 44, whereby the needle threader supporting parts 44 and 46 constitute the outer shape of the needle threader member 42 with the needle threader part 48 sandwiched therebetween. A needle threader pin 48b is formed at the needle threader part 48 so as to project from between the needle threader supporting parts 44 and 46.

The spring 50 has one leg 50a and the other leg 50b forming an angle and is elastically deformable so as to allow the angle to be changed. The leg 50a of the spring 50 is arranged along a groove 44b formed in the needle threader supporting part 44 to be sandwiched between the needle threader supporting parts 44 and 46.

Pivot receiving holes 44c and 46c are formed respectively in the needle threader supporting parts 44 and 46 which are pivotably fitted to the pivots 36j and 38j of the needle receiving parts 36 and 38. Thus, the needle threader supporting parts 44 and 46 are arranged adjacent to the plate-like portions 36i and 38i of the needle receiving parts 36 and 38, the needle threader part 48 and spring 50 are arranged in the cut out portions 36h and 38h of the needle receiving parts 36 and 38,

and the leg **50b** of the spring **50** is abutted against the spring receiving surface **34k**. This arrangement allows the needle threader member **42** to be swingable about the pivots **36j** and **38j** with respect to the needle receiving member **34**. That is, the needle threader member **42** can move between the positions at which the tip end thereof is away from and close to the needle receiving member **34**. Further, in this arrangement, the tip end of the needle threader member **42** is biased by the spring **50** in the direction away from the needle receiving member **34**. When swinging, the needle threader member **42** can pass through the elongated hole **30a** of the main body **30**.

Further, while the needle threader member **42** swings from a position at which the tip end thereof is away from the needle receiving member **34** to a position close to the same, the needle threader pin **48b** of the needle threader part **48** can go into the gap formed between the opposed surfaces of the projecting portions **36d** and **38d** of the needle receiving parts **36** and **38** and pass through the proximal end portions of the elongated groove portions **36c** and **38c** constituting the needle insertion hole **34c** so as to reach the concave portions **36g** and **38g** constituting the thread pass hole **34g**, and can go back along the same route.

When the needle threader member **42** is brought close to the needle receiving member **34** to the maximum extent possible, against the biasing force of the spring **50**, projecting portions **44d** and **46d** formed at the distal ends of the needle threader supporting parts **44** and **46** so as to project in the radial direction and distal end direction are aligned with the projecting portions **36d** and **38d** of the needle receiving parts **36** and **38**.

At the time of nonuse, in the needle thread passing unit **12** having the above configuration, the cover **32** is located at a position (locking position) at which the same covers the proximal end portion of the elongated hole **30a** of the main body **30** as shown in FIG. 2. Thus, parts other than the projecting portions **44d** and **46d** of the needle threader supporting parts **44** and **46** constituting the needle threader member **42** are covered by the cover **32**. In this state, the biasing force of the spring **50** is intercepted by the cover **32**, so that the needle threader member **42** is locked at a position close to the needle receiving member **34** to be housed in the main body **30**, forming a cylindrical shape together with the needle receiving member **34**. Therefore, the needle thread passing unit **12** can be housed compactly in this state. At this time, the tip end of the needle threader pin **48b** of the needle threader part **48** reaches the thread pass hole **34g**, as shown in FIG. 2.

At the time of use, the cover **32** is slid to a position (allowance position) on the proximal end side relative to the main body **30**. As a result, the needle threader member **42** goes out of the cover **32**, allowing the needle threader member **42** to swing outwardly by the biasing force of the spring **50** (FIG. 4). Accordingly, the tip end of the needle threader pin **48b** of the needle threader part **48** passes through the thread pass hole **34g** and the needle insertion hole **34c** and stops at the gap between the projecting portions **36d** and **38d**.

Then, as shown in FIG. 5, a needle **52** is inserted into the needle insertion hole **34c** with a needle eye **52a** directed to the needle insertion hole **34c**. When the needle **52** has been inserted into deeply into the needle insertion hole **34c**, the needle **52** is attracted to the magnet **40** by the magnetic force thereof, so that the needle **52** can be fixed in place, thereby preventing dropping of the needle **52**.

Then, a thread **54** is inserted into the inside of the needle thread passing unit **12** through a thread insertion slit **34e**. The position of the end portion of the thread insertion slit **34e** is set corresponding to the position of the needle eye **52a**. The end portion of the thread insertion slit **34e** extends in the direction

perpendicular to the needle insertion hole **34c**. That is, it is sufficient for the thread **54** to reach the portion extending in the direction perpendicular to the needle insertion hole **34c**, not necessarily reach just the end portion of the thread insertion slit **34e**.

Then, when the needle threader member **42** is pressed so as to allow the same to swing such that the distal ends of the projecting portions **44d** and **46d** of the needle threader supporting parts **44** and **46** are brought close to the needle receiving member **34**, the tip end of the needle threader pin **48b** of the needle threader part **48** passes through the needle eye **52a** while pressing the thread and reaches the thread pass hole **34g** as shown in FIG. 6. When the pressing of the needle threader member **42** is released, the needle threader pin **48b** goes out of the needle eye **52a**, while a state where the thread **54** has been inserted through the needle eye **52a** is kept.

When the needle **52** is taken out of the needle insertion hole **34c**, a part of the thread **54** is kept inserted through the needle eye **52a**. The thread that has been inserted through the needle eye **52a** has a loop as shown in FIG. 7, so that when the loop is made larger until the end of the thread **54** passes through the needle eye **52a**, the loop is released, whereby the needle insertion operation is completed.

After the use, the needle threader member **42** is pressed to bring the distal ends of the projecting portions **44d** and **46d** of the needle threader supporting parts **44** and **46** close to the needle receiving member **34** and, after that, the cover **32** is moved to the locking position, whereby the needle threader can be made in a compact form once again.

As described above, according to the first embodiment of the present invention, its operation can be achieved with the needle threader in hand at the time of use, while at the time of nonuse, the needle thread passing device can be made in a compact form for easy storage.

FIGS. 8 and 9 each show a modification in which the needle thread passing unit **12** and a function unit different from the writing unit **14** are integrated in the axial direction to constitute the needle thread passing device **10**. In FIGS. 8 and 9, containers **60** and **62** are used as the units to be integrated with the needle thread passing unit **12**. Although the containers **60** and **62** are each detachably connected to the main body **30** by screwing in these examples, the connecting method is not limited to this. The container **60** is formed by blow molding and the container **62** is formed by injection molding. A user can put various objects such as pills, threads, needles, or buttons in the container **60** or **62**. These objects can be taken out by removing the container **60** or **62** from the main body **30**.

FIGS. 10 to 14 are views showing a needle thread passing device according to a second embodiment of the present invention. A needle thread passing device **10'** in the present embodiment does not have a plurality of units but instead, integrally has a housing space inside the needle thread passing device. In the present embodiment, the same reference numerals as those in the first embodiment denote the same or corresponding parts as those in the first embodiment, and the descriptions thereof will be omitted here.

The needle threader passing device **10'** includes a cylindrical main body **30**, a cover **32** which is a cylindrical changeover member covering the outside of the main body **30** and freely slidable in a predetermined range with respect to the main body **30** in the axial direction thereof, a needle receiving member **34'**, a needle threader member **42**, a tail cap **84** which is inserted into the main body **30** from the proximal end side (rear side) and fixed therein, and a dial **86** which is rotatably attached to the tail cap **84**.

As shown in FIG. 11, needle receiving parts 36' and 38' constituting the needle receiving member 34' do not expand in the radial direction, but a gap is formed between the main body 30 and the needle receiving parts 36' and 38', and a pair of wall surface portions 84a and 84a extending in the direction toward the tail cap 84 are arranged on both sides of the needle receiving member 34', whereby housing spaces 90 extending in the axial direction are defined between the wall surface portions 84a and the inner circumferential surface of the main body 30.

The tail cap 84 and the needle receiving member 34' may be fixed to the main body 30 by any suitable method such as engagement, fitting, press fitting, or like.

The tail cap 84 has a rear end surface portion 84b for closing the rear end of the main body 30. The rear end surface portion 84b has a center hole 84c at its center and a flange portion 84e surrounding the periphery of the center hole 84c. The rear end surface portion 84b of the tail cap 84 further has a pair of insertion ports 84d and 84d which are eccentrically arranged from the center hole 84c so as to communicate with the housing spaces 90.

The dial 86 is attached to the rear end surface portion 84b of the tail cap 84. A boss portion 86a of the dial 86 is inserted into the center hole 84c of the tail cap 84 to be rotatably engaged with the tip end of the flange portion 84e. The dial 86 has, at a position eccentrically displaced from the center thereof, a window hole 86b which can be aligned with one of the insertion ports 84d.

In the needle threader passing device 10' having the above configuration, it is possible to put the needle 52 and the like in the housing spaces 90 defined between the wall surface portions 84a of the tail cap 84 and the inner circumferential surface of the main body 30. When the needle 52 and the like are put in or taken out, the dial 86 is rotated so as to align the window hole 86b of the dial 86 with one of the insertion holes 84d as shown in FIG. 13, thereby allowing the needle 52 and the like to be put in or take out of the housing space 90. When the dial 86 is rotated after the completion of pulling in or taking out the needle 52 and the like so as to move the window hole 86b to a position that is not aligned with the insertion holes 84d as shown in FIG. 14, it is possible to prevent dropping of the needle 52 and the like put in the housing spaces 90.

A procedure of inserting the thread through the needle eye is the same as in the needle thread passing unit 12 (FIGS. 4 to 6).

According to the needle thread passing device 10', the housing spaces 90 are provided between the main body and needle receiving member, thereby achieving a needle thread passing device with high space efficiency and excellent portability/accommodation capability.

Further, the needle thread passing device is presented as FIG. 15 to FIG. 20 according to a third embodiment of the present invention.

The needle thread passing unit 112 of the needle thread passing device 100 in this embodiment of the present invention includes the cover 132 which is freely slidable with respect to the needle receiving member 134 and needle threader member 142 which is movable between positions away from and close to needle threader member 134. It may be chosen if having the main body or not having the same. The needle receiving member 134 and the needle threader member 142 are respectively corresponding to the needle receiving member 34, 34' and the needle threader member 42 of the former embodiments.

The needle receiving member 134 includes two needle receiving parts 136, 138 which are substantially symmetric with respect to each other, and also magnet 140, protecting cover 152 and cutter 154.

The needle receiving parts 136 and 138 correspond to the needle receiving parts 36 and 38(36', 38') of the former embodiments, and the both parts respectively include engagement projections 136a, engagement hole 138a, flange portion 136b and 138b, elongated groove portions 136c and 138c, projecting portions 136d and 138d, slit 136e and 138e, housing grooves 136f and 138f, concave portions 136g and 138g, cut out portions 136h and 138h, plate-like portions 136i and 138i, pivot receiving holes 136j and 138j, which respectively correspond to engagement hole 36a, engagement projections 38a, flange portion 36b and 38b, elongated groove portions 36c and 38c, projecting portions 36d and 38d, slit 36e and 38e, housing grooves 36f and 38f, concave portions 36g and 38g, cut portions 36h and 38h, plate-like portions 36i and 38i, pivots 36j and 38j of the former embodiments. This arrangement allows needle insertion hole 134c to be formed by the elongated groove portions 136c and 138c, thread insertion slit 134e to be formed by the slit 136e and 138e, magnet housing groove 134f to be formed by the housing groove 136f and 138f, thread pass hole 134g to be formed by the concave portions 136g and 138g.

The needle receiving parts 136 and 138, which are different from the needle receiving parts 36 and 38, have semi cylindrical projections 136k and 138k in the cut out portions 136h and 138h, and a spring receiving projection 134k is formed by these cylindrical projections 136k and 138k.

These needle receiving parts 136 and 138 respectively comprise second concave parts 136m and 138m at the opposite side of the concave parts 136g and 138g for installing the protecting cover 152 and third concave parts 136n and 138n at the same side of the concave parts 136g and 138g for housing the cutter 154 at the concave parts 136g and 138g as well as the construction of the needle receiving parts 36 and 38.

The protecting cover 152 comprises a pair of legs 152a which are largely bent to be U-shaped, and head 152b which is slightly bent at the opposite side of the legs 152a, and a vertical elongated slit 152c is formed at the center of the head 152b. The legs 152a and 152a are attached to the needle receiving parts 136 and 138 so as to pivotably received in a pivoting receiving part formed on the second concave part 136m and 138m of the receiving parts 136 and 138. The protecting cover 152 is elastically deformable. The bending end part of the head 152b has a small projection 152b.

While the protecting cover 152 is attached to the needle receiving parts 136 and 138, a gap is formed between the head 152b of the protecting cover 152 and the needle receiving parts 136 and 138 so as to communicate with the thread insertion slit 134e. This gap and the thread insertion slit 134e are wider than the thread insertion slit 34e in the former embodiment in order to easily insert a thread.

A needle threader member 142 is arranged to sandwich the plate-like portions 136i and 138i and is constituted by two needle threader supporting parts 144 and 146 having substantially the same shape, and a needle threader part 148 sandwiched by the needle threader supporting parts 144 and 146. A plurality of engagement holes 148a formed in the needle threader part 148 and a plurality of engagement holes 146a formed in the needle threader supporting part 146 are fitted to a plurality of engagement projections 144a formed on the needle threader supporting part 144, whereby the needle threader supporting parts 144 and 146 constitute the outer shape of the needle threader member 142 with the needle threader part 148 sandwiched therebetween. A needle



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threader pin **148b** is formed at the needle threader part **148** projecting from the middle of the needle threader supporting parts **144** and **146**.

Pivot **144c** is formed on one side of the needle threader supporting part **144** which is rotatably fitted to the pivot receiving holes **136j** and **138j** of the needle receiving parts **136** and **138**.

On the other hand, cut out portion **146c** is formed in one of the needle threader supporting part **146** so as to correspond to the pivot **144c** of the needle threader supporting part **144**. The spring **150** is inserted between the spring receiving projection **134k** formed by the projections **136k** and **138k** of the needle receiving parts **136** and **138** and the spring receiving parts **144b** and **146b** formed in the needle threader supporting parts **144** and **146**. Further, falling out stopper lugs **144e** and **146e** are formed on the respective opposed faces of the needle threader receiving parts **144** and **146**.

When installing of the threader member **142** to the needle threader receiving member **134**, as shown in FIG. **21(a)**, the pivot **144c** of the thread passing part **144** is inserted into the pivot receiving holes **136j** and **138j** of the needle receiving parts **136** and **138** under the status that the threader member **142** is rotate by 90 degree relative to the needle receiving member **134**.

At this installation operation, the corresponding portion to the pivot **144c** of the needle threader supporting parts **146** is the cut out portion **146c**, which allows the needle receiving member **134** to pass through the cut out portion **146c** and the insertion operation of the pivot **144c** may be operated without interference of the needle threader supporting parts **146**. In the next step, the spring **150** is inserted between the needle threader member **142** and the needle receiving member **134** so as to be set between the spring receiving projection **134k** and the spring receiving parts **144b** and **146b** (FIG. **21(b)**). Further, while the projections **144d** and **146d** are close to the needle receiving member **134** by swing the needle threader member **142**, the falling out stopper lugs **144e** and **146e** of the needle threader supporting parts **144** and **146** respectively pass over the falling out stopper lugs **136p** and **138p** formed on the plate-like portions **136i** and **138i** of the needle receiving parts **136** and **138**, thereby installing the needle threader member **142** to the needle receiving member **134**. The falling out stopper lugs **144e** and **146e** prevent excess swing of the needle threader member **142** by interfering with the falling out stopper lugs **136p** and **138p** once passing over the falling out stopper lugs **136p** and **138p** due to the elastic deformation of the needle threader supporting parts **144** and **146**.

Accordingly, the needle threader supporting parts **144** and **146** are close to the plate-like portions **136i** and **138i** of the needle receiving parts **136** and **138** and the needle threader part **148** and the spring **150** are arranged in the cut out portions **136h** and **138h** of the needle receiving parts **136** and **138**.

Thus, the needle threader supporting part **142** is allowed to swingable about the pivot receiving holes **136j** and **138j** with respect to the needle receiving member **134**, that is, the needle threader member **142** can move between the positions at which the tip end thereof is away from and close to the needle receiving member **134**. Further, in this arrangement, the tip end of the needle threader member **142** is biased by the spring **150** in the direction away from the needle receiving member **134**.

The needle threader pin **148b** of the needle threader part **148** is inserted into the slit **152c** of the protecting cover **152** and the surface of the both sides of the needle threader pin **148b** is sandwiched by the slit **152c**.

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At the time of use, in the needle threader unit having the above configuration, while the cover **132** is slid to the needle receiving member **134** from the position as shown in FIG. **15** like the former embodiments, the needle threader member **142** is allowed to swing and goes into the status as shown in FIG. **16**. At this time, the needle threader pin **148b** of the needle threader part **148** is in the slit **152c** of the protecting cover **152** (FIG. **19**) and protected. The falling out stopper lugs **144e** and **146e** is about against the falling out stopper lugs **136p** and **138p**.

Then, the needle **52** is inserted into the needle insertion hole **134c** with a needle eye **52a** directed to the needle insertion hole **134c**, and the thread **54** is inserted through the thread insertion slit **134e**. Then, when the needle threader member **142** is pressed so as to allow the same to swing such that the tip ends **144f** and **146f** of the projecting parts **144d** and **146d** of the needle threader supporting parts **144** and **146** are brought close to the needle receiving member **134**, the tip end of the needle threader pin **148b** of the needle threader part **148** passes through the needle eye **52a** while pressing the thread and reaches the thread pass hole **134g** as shown in FIG. **20**, enable the thread to pass through needle like the former embodiments.

When the needle threader member **142** swings, the needle threader pin **148b** of the needle threader part **148** always passes through the inside of the slit **152c** of the protecting cover **152**, which restricts displacement of the both sides of the needle threader pin **148b** by the slit **152c** so as to prevent breakage or bent of the thin needle threader pin **148b**. The protecting cover **152** may deform when the projecting parts **144d** and **146d** of the needle threader member **142** is approaching the needle receiving member **134**, while protecting the needle threader pin **148b**, so as not to prevent the needle threader member **142** from approaching the needle receiving member **134**, and further prevent the inserted thread from escaping by means of blocking the thread insertion slit **134e**. Further, the protecting cover **152** may prevent other thread from being inserted into the thread insertion slit **134e**.

The tip ends **144f** and **146f** of the projecting parts **144d** and **146d** of the needle threader supporting parts **144** and **146** make contact with the small projection **152d** of the protecting cover **152** at the fixed timing, of when just before or just after the needle threader pin **148b** passes through the needle eye **52a** (that is the needle insertion hole **134c**). Thus, a clicking feel or a sound may be provided with the users so as to notify the users of the completion of the threadering.

Further, a projection or the like other than this small projection **152d** may be provided at an optional position so as to notify the users of the completion of the threadering.

The invention claimed is:

1. A needle threader passing device comprising:

a needle receiving member formed with a needle insertion hole and a thread insertion slit forming an angle with the needle insertion hole;

a needle threader member that is movable between positions away from and close to the needle receiving member and has a needle threader pin that can push a thread inserted through the thread insertion slit into an eye of a needle inserted into the needle insertion hole when the needle threader member moves from the position away from the needle receiving member to position close thereto; and

a changeover member that can move with respect to the needle receiving member,

wherein the needle threader member is constantly biased toward the position away from the needle receiving member,

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wherein the changeover member can move between a locking position at which the needle threader member is locked to the position close to the needle receiving member and an allowable position at which the needle threader member is allowed to move between the positions away from and close to the needle receiving member, and

wherein the needle threader member can swing so as to allow the tip end thereof to move between the positions away from and close to the needle receiving member, and the changeover member comprises a cover that covers at least a part of the needle threader member at the locking position.

2. A needle threader passing device comprising:  
 a needle receiving member formed with a needle insertion hole and a thread insertion slit forming an angle with the needle insertion hole;  
 a needle threader member that is movable between positions away from and close to the needle receiving member and has a needle threader pin that can push a thread inserted through the thread insertion slit into an eye of a needle inserted into the needle insertion hole when the needle threader member moves from the position away from the needle receiving member to position close thereto; and  
 a changeover member that can move with respect to the needle receiving member,  
 wherein the needle threader member is constantly biased toward the position away from the needle receiving member,  
 wherein the changeover member can move between a locking position at which the needle threader member is locked to the position close to the needle receiving member and an allowable position at which the needle threader member is allowed to move between the positions away from and close to the needle receiving member, and  
 wherein the needle receiving member is arranged in a cylindrical main body, the changeover member can be slid on the outside of the main body, and at least a part of the needle threader member is arranged in the main body when located at the position close to the needle receiving member.

3. The needle threader passing device according to claim 2, wherein a housing space is formed between the main body and needle receiving member.

4. A needle threader passing device comprising:  
 a needle receiving member formed with a needle insertion hole and a thread insertion slit forming an angle with the needle insertion hole;  
 a needle threader member that is movable between positions away from and close to the needle receiving member and has a needle threader pin that can push a thread inserted through the thread insertion slit into an eye of a needle inserted into the needle insertion hole when the needle threader member moves from the position away from the needle receiving member to position close thereto; and  
 a changeover member that can move with respect to the needle receiving member,  
 wherein the needle threader member is constantly biased toward the position away from the needle receiving member,  
 wherein the changeover member can move between a locking position at which the needle threader member is

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threader member is allowed to move between the positions away from and close to the needle receiving member, and  
 wherein a magnet is arranged at the end portion of the needle insertion hole.

5. A needle threader passing device comprising:  
 a needle receiving member formed with a needle insertion hole and a thread insertion slit forming an angle with the needle insertion hole;  
 a needle threader member that is movable between positions away from and close to the needle receiving member and has a needle threader pin that can push a thread inserted through the thread insertion slit into an eye of a needle inserted into the needle insertion hole when the needle threader member moves from the position away from the needle receiving member to position close thereto; and  
 a changeover member that can move with respect to the needle receiving member,  
 wherein the needle threader member is constantly biased toward the position away from the needle receiving member,  
 wherein the changeover member can move between a locking position at which the needle threader member is locked to the position close to the needle receiving member and an allowable position at which the needle threader member is allowed to move between the positions away from and close to the needle receiving member, and  
 wherein the needle receiving member further includes a protecting member for guiding the movement of the needle threader pin.

6. The needle threader passing device according to claim 5, wherein the protecting member is deformable while the needle threader member approaches the needle receiving member so as to allow approach of the needle threader member.

7. A needle threader passing device comprising:  
 a needle receiving member formed with a needle insertion hole and a thread insertion slit forming an angle with the needle insertion hole;  
 a needle threader member that is movable between positions away from and close to the needle receiving member and has a needle threader pin that can push a thread inserted through the thread insertion slit into an eye of a needle inserted into the needle insertion hole when the needle threader member moves from the position away from the needle receiving member to position close thereto; and  
 a changeover member that can move with respect to the needle receiving member,  
 wherein the needle threader member is constantly biased toward the position away from the needle receiving member,  
 wherein the changeover member can move between a locking position at which the needle threader member is locked to the position close to the needle receiving member and an allowable position at which the needle threader member is allowed to move between the positions away from and close to the needle receiving member, and  
 wherein a notifying means for generating a sound or friction force is provided between the needle receiving member and the needle threader member in response to the needle threader pin of the needle threader member passing through the needle insertion hole.

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8. A needle threader passing device comprising:  
 a needle receiving member formed with a needle insertion hole and a thread insertion slit forming an angle with the needle insertion hole;  
 a needle threader member that is movable between positions away from and close to the needle receiving member and has a needle threader pin that can push a thread inserted through the thread insertion slit into an eye of a needle inserted into the needle insertion hole when the needle threader member moves from the position away from the needle receiving member to position close thereto; and  
 a changeover member that can move with respect to the needle receiving member,  
 wherein the needle threader member is constantly biased toward the position away from the needle receiving member,  
 wherein the changeover member can move between a locking position at which the needle threader member is locked to the position close to the needle receiving member and an allowable position at which the needle threader member is allowed to move between the positions away from and close to the needle receiving member, and  
 wherein the needle threader member comprises a pair of needle threader supporting parts and a needle threader part including the needle threader pin arranged between the pair of needle threader support parts, one of the pair of the thread supporting parts having an axis pivotally supported by the needle receiving member and the other of the pair of the thread supporting parts having a cut out portion at a location corresponding to the axis.
9. The needle threader passing device according to claim 1, wherein the needle receiving member is arranged in a cylindrical main body, the changeover member can be slid on the outside of the main body, and at least a part of the needle threader member is arranged in the main body when located at the position close to the needle receiving member.
10. The needle threader passing device according to claim 1, wherein a magnet is arranged at the end portion of the needle insertion hole.
11. The needle threader passing device according to claim 2, wherein a magnet is arranged at the end portion of the needle insertion hole.
12. The needle threader passing device according to claim 1, wherein the thread insertion slit extends from the outside surface of the needle receiving member in the direction inclined with respect to the needle insertion hole, and then extends toward the needle insertion hole in the direction perpendicular to the needle insertion hole.
13. The needle threader passing device according to claim 2, wherein the thread insertion slit extends from the outside

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- surface of the needle receiving member in the direction inclined with respect to the needle insertion hole, and then extends toward the needle insertion hole in the direction perpendicular to the needle insertion hole.
14. The needle threader passing device according to claim 4, wherein the thread insertion slit extends from the outside surface of the needle receiving member in the direction inclined with respect to the needle insertion hole, and then extends toward the needle insertion hole in the direction perpendicular to the needle insertion hole.
15. The needle threader passing device according to claim 1, wherein the needle threader passing device is constructed by integrating a needle threader unit and a unit having a different function from that of the needle threader unit, the needle threader unit including the needle receiving member, the needle threader member, and the changeover member.
16. The needle threader passing device according to claim 2, wherein the needle threader passing device is constructed by integrating a needle threader unit and a unit having a different function from that of the needle threader unit, the needle threader unit including the needle receiving member, the needle threader member, and the changeover member.
17. The needle threader passing device according to claim 4, wherein the needle threader passing device is constructed by integrating a needle threader unit and a unit having a different function from that of the needle threader unit, the needle threader unit including the needle receiving member, the needle threader member, and the changeover member.
18. The needle threader passing device according to claim 5, wherein a notifying means for generating a sound or friction force is provided between the needle receiving member and the needle threader member in response to the needle threader pin of the needle threader member passing through the needle insertion hole.
19. The needle threader passing device according to claim 8, wherein a notifying means for generating a sound or friction force is provided between the needle receiving member and the needle threader member in response to the needle threader pin of the needle threader member passing through the needle insertion hole.
20. The needle threader passing device according to claim 5, wherein the needle threader member comprises a pair of needle threader supporting parts and a needle threader part including the needle threader pin arranged between the pair of needle threader support parts, one of the pair of the thread supporting parts having an axis pivotally supported by the needle receiving member and the other of the pair of the thread supporting parts having a cut out portion at a location corresponding to the axis.

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